IC 2001-1 TO AFMAN 91-201, EXPLOSIVES SAFETY STANDARDS

18 OCTOBER 2001

★*SUMMARY OF REVISIONS*

This change incorporates new Department of Defense Explosives Safety Board (DDESB) criteria, clarifies guidance, and updates references. Specifically it list MAJCOM JA coordination for non-DoD munitions storage requests (paragraph 1.3.2); updates Operational Risk Management references throughout the manual; adds information on fusible links (paragraph 2.27.7); clarifies explosives license procedures (paragraphs **2.35** - 2.35.6); clarifies static electricity and grounding guidance (paragraphs **2.51** - 2.51.3.2); clarifies side flash guidance (paragraph 2.54.1.3); updates electromagnetic radiation hazard guidance (paragraphs 2.54.2.1 - 2.54.2.5); provides expanded guidance on clear zones extending past the base boundary (paragraph 3.2.1.1); updates quantity-distance criteria and notes (**Table 3.3**); incorporates new criteria for EOD procedures (paragraphs 3.28.1, 3.28.1.7, 3.28.3.6, 3.28.7, 3.28.4.4, 3.28.4.9 and 3.28.4.10); updates AIM-7 with WAU-17 warhead guidance (paragraphs 3.34.5 - 3.34.6, and **Table 3.26**); adds new terms and definitions to glossary; updates AF Form 943 guidance (Attachment 4); provides new DDESB guidance for PTR criteria (Attachment 10). A star (★) indicates revision from the previous edition.

★1.1.1. Observe explosives safety practices during all operations (includes war time, preparation for war, armistice, heightened tensions, etc.) that include the use of live explosives.

★1.3.1. Listed below are examples of storage or disposal activities involving non-DoD owned or non-Air Force approved ammunition and explosives or other energetic materials on Air Force installations that may be authorized provided the requirements set forth in paragraphs 4.1.3.5 and 5.2.8, and Table 3.27 are met:

★1.3.2. Requests for Secretary of Defense or SAF determinations (as referenced above) will be in memorandum format. Units will forward requests through their MAJCOMs, and will obtain MAJCOM SE and JA coordination (JA refer to full text of 10 USC 2692 with 1998 Authorization Act changes) prior to forwarding to HQ AFSC/SEP. Units need not always submit a single letter for each and every time non-DoD explosives must be stored on base. Instead, units can list the items, quantities and length of time they know or can reasonably expect they'll have to store for the coming year, or for however far into the future they can realistically predict. Include in these requests explanations of how the storage of the non-DoD explosives will directly or indirectly benefit either the US government or its citizenry. Examples of potentially justifiable reasons include (but are not necessarily limited to) public safety, support to a federal agency other than DoD; cooperation with state and local governments; support for US Government Foreign Military Sales; DoD-supported commercial space launch activities; enhanced military operations or products, greater military personnel proficiency, and national defense.

★1.3.5. For licenses involving privately owned ammunition outside the United States and Guam, obtain the installation's judge advocate coordination in part V of the AF Form 2047, **Explosives Facility License**; this will ensure no host nation laws are being violated.

★1.5. Commanders Risk Assessment. Explosives safety criteria in this manual help commanders make informed decisions on the proper mix of combat readiness and safety. These criteria specify minimum acceptable standards for explosives safety. Departure from explosives safety standards must only result from operational necessity and all risks associated with the departure must be completely understood and accepted by the appropriate approval authority. According to AFI 90-901, *Operational Risk Management*, the following ORM principles apply: (1) Accept no unnecessary risk, (2) Make risk decisions at the appropriate level, (3) Accept risk when benefits outweigh the costs, (4) Integrate ORM into Air Force Doctrine and planning at all levels. Refer to AFPAM 90-902, *Operational Risk Management (ORM) Guidelines and Tools*, for methods on eliminating or reducing risk to support the six-step process of Operational Risk Management (see Figure 1.1). If explosives safety quantity-distance standards cannot be met, the WSM will process the exception in accordance with Chapter 5.

★2.2. Personnel Qualifications. Personnel who work with explosives will be trained in accordance with AFI 91-202, Chapter 10, and qualified in the tasks to be performed. They must understand all safety standards, requirements, and precautions that apply to their operations. The supervisor must be knowledgeable of all the hazards involved in the operation, convey emergency procedures to the workers and visitors, and maintain strict housekeeping standards. The supervisor must also know what steps to take when abnormal conditions arise.

★2.3. Locally Written Instructions. Develop written instructions, approved by the squadron commander or equivalent, for explosives operations. If other documents such as technical orders and safety briefings cover all applicable items required in paragraph 2.4 below, separate written instructions are not required.

★2.8.1. Purchase of commercial off the shelf (COTS) explosives or munitions items is prohibited unless they are approved for purchase by OO-ALC/WMOI, 6064 Dogwood Avenue, Hill AFB, UT 84056-5816. Submit requests for approval according to AFI 21-201, *Management and Maintenance of Non-Nuclear Munitions*, Chapter 32.

★2.8.2. Emergency requirements are approved by HQ AFSC/SE, 9700 Avenue G SE, Kirtland AFB NM 87117-5671. Air Force laboratories or research and development activities are exempt from these purchasing limitations.

★2.12. Handling Explosives and Movement Precautions. Only trained personnel under the supervision of an individual who understands the hazards and risks involved in the operation are to handle explosives. This paragraph applies to handling explosives and movement of explosives within the immediate vicinity of the operation. Follow this guidance:

★2.12.8. (Added) Always consider vehicle and handling equipment type, type of load, and prevailing weather and surface conditions when determining if safe movement is feasible.

★2.12.9. (Added) Restraining devices designed for use with vehicle and handling equipment will be used in accordance with applicable technical orders.

★2.15.3.9. Required distances may be reduced by barriers designed in accordance with TM5-1300, *Structures to Resist the Effects of Accidental Explosions.* Provide the design criteria to HQ AFSC/SEW for approval.

★2.15.5. Ground burst or hand grenade simulators present a blast hazard. Exercise caution around people, facilities and equipment. Free the area of combustible material within a ten feet radius. Monitor for proper functioning and disposal of residue. Notify EOD or other qualified personnel when a munition malfunctions. The on scene commander will determine minimum withdrawal distance for malfunctioned ground burst or hand grenade simulators for the given situation. This distance will never be less than the minimum distances given in paragraph 2.24.2, or applicable item TOs, whichever is greater.

★2.24.2. Non-Essential Personnel. For guidance on how far to withdraw nonessential personnel during fires involving explosives, use Table 2.1. When explosives are not involved in fire, such as dropped munitions or partially armed munitions, clear the area initially to a distance of 300 feet (125 feet for simulators and smoke producing devices). After evaluation of the situation, the on-scene commander may adjust the withdrawal distance for non-essential personnel. Nuclear weapons withdrawal distances are listed in TO 11N-20-11, *General Fire Fighting Guidance*.

2.24.3. (Added) Withdraw all non-essential personnel an initial distance of 500 feet for improvised explosive devices (IED) up to box size (large briefcase/package 2 cubic feet) and 1,000 feet for barrel size or vehicle type IEDs. On-scene authorities may expand/shrink this distance when the situational analysis warrants it.

★2.26.1.2. Place explosives items received without an assigned hazard classification in segregated storage (HC/D 1.1L). Contact HQ AFSC/SEW or OO-ALC/WMOI for assistance.

★2.27.8. Where fusible links are installed, leave unpainted, and ensure they are serviceable, properly installed, and rated for a maximum temperature of 155^{o} F to 165^{o} F (NSN 4210-00-033-6032 or suitable substitute). Fusible links are designed to release the vent when an outside fire or source of heat threatens the igloo.

★2.35. Licensed Explosives Locations. Use AF Form 2047, **Explosive Facility License**, for ammunition and explosives storage locations (not for explosives operations), which are normally outside the base explosives storage area, but within the US Air Force Area of Control. Licenses to store munitions are requested from the installation or host safety office. Quantities of munitions depicted on the license are limited to minimum quantities necessary to support specific, mission essential, explosives operations or missions. Licenses are not to be used for convenience. Individual AF Forms 2047 must be signed by the requesting organization (see Attachment 3); coordinated through Munitions Accountable System Officer, the local Security Forces Resource Protection office and the Base Fire Protection agency prior to being signed by the Base Weapons Safety Office. Display licenses at the licensed facility.

★2.35.1. Licensed Compatibility. Compatibility groups A, K, and L are not to be licensed. Compatibility requirements specified elsewhere in this manual do not apply.

★2.35.2. Quantity Distance. Except for specific quantity distance requirements outlined below, quantity distance requirements depicted elsewhere in this manual do not apply.

★2.35.2.1. Quantity distance is not a factor for any amount of licensed hazard class/division 1.4 explosives.

★2.35.2.2. A minimum separation of 25 feet is required between licensed locations containing hazard class/division 1.3 explosives and adjacent explosives operations, personnel, or other licensed locations containing hazard class/division 1.3, (04)1.2, or 1.2.2. Where 25 feet cannot be obtained, a 2 hour fire wall, constructed in accordance with paragraph 4.19 is required.

★2.35.2.3. A minimum separation of 100 feet is required between licensed locations containing hazard class/division (04)1.2 or 1.2.2 explosives and adjacent explosives operations, personnel, or other licensed locations containing hazard class/division 1.3, (04)1.2 or 1.2.2 explosives. Where 100 feet cannot be maintained, a fragment barrier that provides protection equal to 1/4 inch mild steel plate or one layer of sand bags is required. A barrier or wall constructed in accordance with paragraph 4.20 is acceptable without supporting analysis.

★2.35.3. Maximum Licensed Quantities. The quantities of explosives, expressed as NEWQD may not be exceeded on any one license.

★2.35.3.1. Mission essential quantities of hazard class/division 1.4 explosives.

★2.35.3.2. Hazard class/division 1.3 explosives, 100 pounds NEWQD.

★2.35.3.3. Hazard class/division 1.2.2 or (04)1.2, 50 pounds NEWQD.

★2.35.3.4. Where hazard class/division 1.3 and 1.2.2 or (04)1.2 are licensed in the same location, the cumulative NEWQD is limited to 100 pounds, not to exceed 50 pounds HC/D 1.2.2 or (04)1.2.

★2.35.4. Operations Involving Licensed Explosives. The unit/squadron commander (or equivalent) approves local written procedures (see paragraph 2.4) as the authorization for operations involving licensed explosives. An ESP is not required as a PES, but may be required as an ES if located within any other PES clear zone. Safe separation distances must meet the minimum distances specified in paragraph 2.35.2 above.

★2.35.5. Mobility Storage. Explosives and chemical items designated for mobility should be stored within the base munitions storage area until ready for shipment (exception: deploying unit has an extremely short timeline requirement that makes it impossible to store within the MSA). Licensing pre-positioned mobility explosives is permitted if a properly sited area is not available. The license is valid only for the duration of the mobility tasking.

★2.35.6. (Added) Exercises. Licensing munitions locations used solely for exercises, such as the ground burst simulators, smoke grenade storage, etc., is permitted. This license is valid only for the duration of the exercise.

★2.35.7. (Added) Validation and Inspection of Explosives Facility License. Base weapons safety personnel validate the license request and the quantity of explosives to be kept, ensuring only the smallest quantities needed to support requirements are authorized. Before granting the license, the installation weapons safety and security representatives must physically inspect the facility to ensure:

★2.35.7.1. (Added) The structure or room used for storage can be locked to prevent pilferage and unauthorized handling. Contact Security Forces for resource protection requirements.

★2.35.7.2. (Added) Fire and chemical symbols are available for posting in accordance with paragraph 2.25.7.1.

★2.35.7.3. (Added) When necessary use dunnage to provide ventilation around explosives stocks and protect them from moisture and heat buildup.

★2.35.7.4. (Added) The base fire chief has coordinated on the license and included the type and quantity of fire extinguishers, their placement at the licensed location and any additional fire prevention practices.

★2.35.8. (Added) Renew licenses each time a hazard class, type or quantity of explosives changes. Review each license at least annually for continued requirement and applicability. Revoke licenses when the requirement no longer exists. Ensure the user displays a copy of the license and operating procedures at each storage location. When Munitions Operations (AFK) issues suitable substitutions for stock listed items, revision and renewal of the license is not required as long as the hazard/ class division, NEWQD, compatibility group, and quantity does not change. Place an asterisk (*) next to the stock number listed in column "C" of the AF Form 2047 that is posted at the location and enter in the "Remarks" block, "*Suitable substitute issued."

★2.36. Items or Situations not Requiring a License. Paragraph 2.35 does not apply to the storage of small arms ammunition (.50 caliber or less), commercial maritime distress signals and like items held by base exchanges and individuals

in family housing. However, if the base exchange stores primers and smokeless powder, complete a license and apply the limitations of paragraph 2.37.8. This exception also applies to locations storing less than 1000 rounds of HC/D 1.4 small arms ammunition or cartridges for cartridge actuated tools (up to 5,000 feet of shock tube) and locations storing thermal batteries. However, this exception for quantities less than 1,000 rounds of HC/D 1.4 does not apply to the on base storage of bird scare ammunition, privately owned ammunition belonging to dormitory and billeting residents; or approved commercial off the shelf explosives, (except as noted in this manual). These ammunitions will always be stored in approved, licensed explosives storage locations, regardless of quantity. See also paragraph 2.37.2.

★2.37.2. Survival/Rescue Equipment. A license is not required for assembled parachutes, survival and rescue kits, life rafts and life preservers containing authorized explosives when kept in personnel equipment rooms or life raft, survival equipment and life support shops. A license will be required for those areas in which survival equipment explosive components are stored. An operating instruction, approved by the commander (see paragraph 2.4), is required for all survival/rescue shop operations involving explosive components.

★2.37.3. Riot Control Items. If required, store riot control and smoke grenades (except white phosphorus "WP" grenades) with small arms ammunition in arms rooms and other such locations. However, if the arms room is collocated with a facility where personnel are under physical restraint or confinement, the National Fire Codes, Standard 101, Life Safety Code, applies. Don't store 40 millimeter grenades, pyrotechnics, tear gas or chemical irritant in the room regardless of the Q-D class/division or compatibility, unless the arms room has protective features which completely protect detainees from the effects of accidental explosives activation. Protective features include fragment barriers, blast doors, and exhaust fans. Qualified engineers must evaluate capabilities of protective features. Limit the quantity to the smallest amount needed to support approved contingency plans.

★2.37.4.1. Ejection seats, canopies, and explosives components not undergoing actual maintenance, will be stored in a separate location other than within the maintenance area. Ejection seats may only be stored in the maintenance area while maintenance is being conducted on other seats, if all explosive components have been removed from the seats to be stored and placed in a separate storage location.

★2.37.4.3. Turn in unserviceable explosive components/items to the base munitions storage area as quickly as possible to preclude build-up of unserviceable NEWQD. Unserviceable NEWQD must be counted against the total NEWQD of the licensed facility.

★2.37.9.13. Cover tables used for hand loading with a seamless, nonporous, non-sparking conductive material.

★2.37.12. Flightline Munitions Holding Areas. Identify these areas by a physical boundary (such as rope and stanchions). Post signs to keep unauthorized personnel out of the area and to prohibit smoking within 50 feet. Post explosives limits and ensure authorizations are not exceeded. Provide fire extinguishers and post fire symbols. If providing permanent shelter for personnel, position missiles so the shelter is out of radial alignment with the warheads. Secure according to AFI 31-101 and DoD 5100.76-M, or return munitions to MSA for storage.

2.37.13. (Delete this paragraph)

★2.41.1. Cells with 12-inch reinforced concrete substantial dividing walls or equivalent protection may be filled to capacity with HC/D 1.2.2 and 1.2.3 items. This also applies to HC/D 1.2.1 items if there is a 3 feet stand off and the NEWQD per package is less than 100 pounds. Also the Maximum Credible Event (MCE) must be less than 425 pounds. See paragraph 3.5.2.3 for determining MCE. When using the provisions in this subparagraph, each cell may be considered a separate facility with equivalent IM distance between cells, for determining NEWQD in Q-D calculations.

★2.51. Static Electricity and Grounding. Static electricity is created when charges are allowed to accumulate to the point where an uncontrolled discharge occurs. This discharge can cause a mishap if it occurs through, or in the presence of, a hazardous substance susceptible to electrostatic initiation.

★2.51.1. Some hazardous substances are more susceptible to electrostatic initiation than others. Extra caution should be used to minimize the potential of electrostatic discharge during operations involving:

★2.51.1.1. (Added) Exposed propellants (excluding C-4).

★2.51.1.2. (Added) Unpacked electrically initiated explosive devices.

★2.51.1.3. (Added) Hazardous locations (see paragraph 2.46).

★2.51.2. Personnel can minimize the possibility and severity of a buildup of static electricity by:

★2.51.2.1. (Added) Avoiding using rags or wearing outer garments made of materials which have high-static generating characteristics (e.g., 100% polyester, nylon, rayon, silk, wool, etc.). Wool socks, glove inserts, and caps as well as undergarments of synthetic fabrics are less of a hazard than outer garments such as jackets or pants.

★2.51.2.2. (Added) Using rags or wearing outer garments made of cotton or a cotton-synthetic blend. Normally, clothing materials acceptable for flightline use (per TA 016) are acceptable for handling munitions. This includes Gortex which is 100% nylon.

★2.51.2.3. (Added) Minimizing exposure to conditions which aid the buildup of static electricity such as cold, dry climates or dry, windy climates.

★2.51.2.4. (Added) Minimizing activities which aid the buildup of static electricity such as physical motion or contact with moving non-conductive substances.

★2.51.3. (Added) Personnel can minimize the possibility and severity of a discharge of static electricity by:

★2.51.3.1. (Added) Discharging their static electric potential (or equalizing it to that of the system being handled) prior to touching the system. NOTE: Always avoid directly touching an electrical primer.

★2.51.3.2. (Added) Minimizing activities which can discharge static such as removing outer garments.

★2.52.1. Grounding Equipment. The method generally used to eliminate or reduce the hazard from static electricity is to provide an electrically continuous path to ground. A resistance of 25 ohms is common. These grounds should be one continuous ground wire/cable/strap. Short ground wires/cables/straps should not be connected together to make a longer one. Additionally, each ground wire/cable/strap should be connected to the item and/or facility ground individually. Connecting multiple ground wires/cables/straps to another ground wire/cable/strap connecting mechanism (alligator clip, clamp, etc.) should be avoided.

★2.52.1.5. (Added) When making a grounding connection, you should attach the ground wire/cable/strap to the item requiring grounding first, then connect the other end of the ground wire/cable/strap to the approved facility grounding system; this ensures that if a spark occurs, it will occur at the connection to the facility grounding system instead of at the item. When a different or new ground is needed for the same item, always make the new ground connection first (in the same manner as previously described) before you disconnect the existing ground connection (make-before-break grounding); this ensures that the item will be grounded at all times while transitioning from one ground connection to another.

★2.54.1.3.1. Side flash protection for nuclear weapons. In the following sentences, the term “intrusive maintenance” means maintenance that includes operations performed inside the weapon’s sealed case. When conducting intrusive maintenance operations inside a HAS, maintain a 7-foot minimum distance between an LPS unmodified WMT and the ceiling, walls, and metallic conductors (such as a tool box or metal cabinet) inside the HAS. If no WMT is being used, maintain that same 7 feet distance from the weapon itself and the HAS’s ceiling, walls, and metallic objects. When using an LPS unmodified WMT, include the stairs and attached support equipment while measuring the 7-foot distance. When using an LPS modified WMT, no minimum distance is required provided all additional safety requirements are adhered to in accordance with TO 11N-20-7.

★2.54.1.3.1.2. If any metallic conductor is within 7 feet of a facility’s wall or ceiling, the buffer between the weapon and the wall or ceiling must be at least 7 feet plus the width of the metallic conductor(s). For example, a weapon may not be placed closer than 10 feet from a wall having a 3-foot wide toolbox against it.

★2.54.1.8. Lightning Protection Exceptions. Properly maintained lightning protection is required for ammunition and explosives facilities, with the following exceptions provided that the responsible commander accepts the loss of resources and structure at the location without LPS or inadequate LPS and any potential collateral damage to other nearby exposures (except for sub-paragraphs 2.54.1.8.3, 2.54.1.8.4, and 2.54.1.8.8). The commander’s risk acceptance must be documented by letter (i.e., signed by the commander stating he/she understands and accepts the potential loss of resources and structures at the location without LPS and any potential collateral damage to other nearby exposures) and this letter must be submitted as part of the explosives site plan request package.

★2.54.1.8.2. Facilities where personnel are not expected to sustain injury and, at the same time, the resulting economic loss of the structure, its contents or surrounding facilities is minimal.

★2.54.1.8.3. Air terminal systems are not required on HASs or on metal aircraft shelters.

★2.54.1.8.4. Lightning protection systems may be omitted on flightline PESs if the system interferes with flightline criteria.

★2.54.1.8.5. Facilities used for temporary (non-recurring) storage of munitions.

★2.54.1.8.6. (Added) Structures, facilities, or mobile equipment housing explosives or explosives operations not regularly situated at a fixed location.

★2.54.1.8.7. (Added) Structures and facilities limited to the storage or handling of small arms ammunition where the value of the ammunition is $10,000 or less.

★2.54.1.8.8. (Added) Licensed explosives locations outside the explosives storage area but situated in buildings primarily used for other purposes and that have relatively small quantities of explosives. ***NOTE:*** This exemption from additional or special lightning protection is made because of the explosives. Other contents of the building may require protection.

2.54.2. (Delete this paragraph)

2.54.2.1 through 2.54.2.5. (Delete these paragraphs)

★2.55.2.2. Unless the test equipment is incapable of initiating the item being tested, operational shields should be provided where needed to protect personnel from injury.

★2.58.2.1. EEDs are typically designed to be initiated by low levels of electrical energy. As such, they are susceptible to unintentional ignition by many forms of direct or induced electrical energy such as from lightning discharges, static electricity, or turbo-electric (friction-generated) effects. Another aspect of this hazard is the accidental initiation of EEDs by radio frequency (RF) energy due to ground and airborne emitters.

★2.58.2.2. Electromagnetic energy can be either conducted or radiated. Conducted electromagnetic energy is imposed on circuits from other subsystems or sources by various methods. Examples are inductive or capacitive coupling from other cabling, sneak ground circuits, defective components or wiring, or errors in design.

★2.58.3. The requirements in this section are designed to preclude inadvertent EED initiation from radiated electromagnetic energy. Susceptibility to electromagnetic radiation (EMR) is dependent on a number of variables. Among these are the no-fire sensitivity level of the EED; the configuration of the leads, circuit, or installation; and the frequency and power density of the EMR environment.

★2.58.4. The primary means for insuring EMR does not cause inadvertent EED initiation is by limiting the power density to levels below the no-fire sensitivity threshold of the EEDs. This is done by maintaining a safe separation distance between the emitter and the EED(s). This distance is a factor of the effective radiated power (ERP) and frequency of the emitter. ERP is a product of the transmitter power and the gain of the transmitting antenna. Antenna gain is a measure of the power channeled by a directional antenna. It is usually provided in decibels (dB). Sometimes it is provided as a unitless number, G_t. Use the following formula to convert between G(dB) and G_t:
$G_t = \log^{-1}[G(dB)/10] = 10^{[G(dB)/10]}$

Frequency is measured in hertz (Hz) or cycles per second. Use the following formulas to convert between kHz (1000 Hz), MHz (1,000,000 Hz), and GHz (1,000,000,000 Hz):
1 kHz = .001 MHz

1 GHz = 1000 MHz

Transmitter power, P_t, is expressed in watts (W). If a transmitter is pulsed, it will have both a peak and average P_t. Generally, peak P_t is the best number to use when determining ERP. However, pulsed systems with small pulse widths (less than 1 millisecond) may be more accurately represented by average power (see note 3 to Table 2.5).

★2.58.5. Table 2.5 should be used as a guide in setting up safe separation distances between EEDs and the transmitting antenna of all RF emitters or determining the maximum power density allowable for an EED. These calculations are based on "worst-case" assumptions, such as EEDs with a maximum no-fire sensitivity of 50 mW and far-field conditions. The far field of the antenna provides a more consistent power density environment than that found in the near field. The following formula can be used to determine where the far field begins:
$R_{ff} = 2D^2f/c$ where

R_{ff} = distance, in meters, from transmitting antenna where the far field begins

D = largest dimension of the antenna, meters

F = frequency (Hz)

c = speed of light, 3×10^8 m/s

For near field conditions, see TO 31Z-10-4, Chapter 4, Section 2.

★2.58.6. Safe Separation Distance Criteria.

★2.58.6.1. Column A, Worst Case or Unknown Configuration. When EEDs are unshielded, or the leads or circuitry could inadvertently be formed into a resonant dipole or loop antenna, or the configuration of the EEDs is unknown.

★2.58.6.2. Column B, Exposed EEDs. When EEDs are exposed due to maintenance, assembly, or disassembly or the item or munition which contains the EED is exposed due to maintenance, assembly, or disassembly.

★2.58.6.3. Column C, EEDs in Storage or Ground Transport in a Metallic Container. When EEDs are stored or in a ground transport configuration inside a conductive (metallic) container. This includes EEDs assembled in a weaponized configuration when the weapon case provides a conductive shield.

★2.58.6.4. Column D, EEDs in Storage or Ground Transport in a Non-Metallic Container. When EEDs are stored or in a ground transport configuration inside a non-conductive (non-metallic) container such as wood or plastic.

★2.58.6.5. Column E, EEDs In or On Aircraft. When EEDs or the item or munition containing them are in a transport configuration inside cargo aircraft or externally loaded on an aircraft.

★2.58.6.6. Column F, Leadless EEDs. When EEDs do not have lead wires and are in the original shipping configurations and/or containers. This does not include handling and/or installing leadless EEDs (column B applies).

★2.58.6.7. When unclear about the appropriate configuration and column to apply from Table 2.5, use the most conservative, i.e., the greatest distance or largest power density.

★2.58.7. Maximum Power Density Criteria.

★2.58.7.1. When electrical characteristics of the EEDs are not known or when the minimum safe separation distances cannot be complied with because of lack of real estate or other limitations, a power density and field intensity survey should be made. Compare the measured power density with the recommended maximum power density calculated from Table 2.5. The measured power density must be no greater than the maximum power density.

★2.58.7.2. When more than one transmitter is operating in an area, each at a different frequency, the maximum allowable power density is the greatest power density calculated for each of the transmitters.

★2.58.8. Approximate calculations for safe separation distances can also be made using the nomograph provided in Figure 2.3. Example 1 in paragraph 2.58.10 illustrates how to apply this nomograph.

★2.58.9. Assistance Requests. Same as 2.58.10, except change “SA-ALC/NWI” to “AAC/WN.”

(Change paragraph number 2.58.10.1 to 2.58.9.1)

(Change paragraph number 2.58.10.2 to 2.58.9.2)

(Change paragraph number 2.58.10.3 to 2.58.9.3)

(Change paragraph number 2.58.10.4 to 2.58.9.4)

(Change paragraph number 2.58.11 to 2.58.10)

★Table 2.5. Recommended EED Safe Separation Distances and Power Densities.

Column	A	B		C	D		E	F
Configuration of EED	Worst Case or Unknown	Exposed EED		EED in Storage or Transport (Metal Container)	EED in Storage or Transport (Non-metal Container)		EED in Or On Aircraft	Leadless EED
		Frequency	Formula		Frequency	Formula		
Recommended Separation Distance (or Formula for Distance)	Use Figure 2.3 or Column B	Up to 20khz	$D = .093 \times \sqrt{P_t G_t}$	$D = .093 \times \sqrt{P_t G_t}$	Up to 63kHz	$D = .093 \times \sqrt{P_t G_t}$	$D = .093 \times \sqrt{P_t G_t}$	D=10 feet
		20kHz to 2MHz	$D = 4.63 f \times \sqrt{P_t G_t}$		63kHz to 2MHz	$D = 1.46f \times \sqrt{P_t G_t}$		
		2MHz to 48.5 MHz	$D = 9.26 \times \sqrt{P_t G_t}$		2 MHz to 48.5 MHz	$D = 2.93 \times \sqrt{P_t G_t}$		
		48.5 MHz to 4.85GHz	$D = \frac{450}{f} \times \sqrt{P_t G_t}$		48.5 MHz to 1.53 GHz	$D = \frac{142}{f} \times \sqrt{P_t G_t}$		
		4.85GHz to 45GHz	$D = .093 \times \sqrt{P_t G_t}$		1.53 GHz to 45 GHz	$D = .093 \times \sqrt{P_t G_t}$		
Recommended Maximum Power Density	$P_o = \frac{0.01W}{m^2}$	Up to 20kHz	$P_o = \frac{100W}{m^2}$	$P_o = \frac{100W}{m^2}$	Up to 63kHz	$P_o = \frac{100W}{m^2}$	$P_o = \frac{100W}{m^2}$	Not Applicable
		20kHz to 2 MHz	$P_o = \frac{.04}{f^2}$		63kHz to 2 MHz	$P_o = \frac{.4}{f^2}$		
		2MHz to 48.5 MHz	$P_o = \frac{0.01W}{m^2}$		2MHz to 48.5MHz	$P_o = \frac{0.1W}{m^2}$		
		48.5 MHz to 4.85 GHz	$P_o = 4.256 \times 10^{-6} \times f^2$		48.5MHz to 1.53GHz	$P_o = 4.256 \times 10^{-5} \times f^2$		
		4.85GHz to 45GHz	$P_o = \frac{100W}{m^2}$		1.53GHz to 45GHz	$P_o = \frac{100W}{m^2}$		

NOTES:

★1. In the formulas above:

D = distance (ft)

f = frequency (MHz)

P_t = transmitter power (W)

G_t = antenna gain. To convert from G (dB), use $G_t = \log^{-1}[G(dB)/10]$

P_o = maximum power density (W/m^2)

★2. Use peak power for P_t except for pulsed systems with pulse widths less than one millisecond (ms). In this case, use the larger of 1) the average power or 2) (peak power) x (largest pulse width expressed in ms)/1 ms. Note: 1 ms = .001 seconds.

★3. For EEDs with a no-fire sensitivity less than 50 mW, request assistance in accordance with paragraph 2.58.10.

★4. For frequencies outside the ranges specified in Table 2.5, request assistance in accordance with paragraph 2.58.10.

★5. Formulas in Table 2.5 apply to the far field of the antenna only. For near field requirements, see TO 31Z-10-4, Chapter 4, Section 2. Far field is determined by

$R_{ff} = 2D^2f/c$

R_{ff} = far field range in meters

D = largest dimension of the antenna in meters

f = frequency in Hz

c = speed of light, $3x10^8$ m/s

★2.67. Guides for Controlling Incoming Explosives Shipments. Review guidance in the Transportation Facilities Guide maintained by Military Traffic Management Command (MTMC) http://baileys-mtmcwww.army.mil/transys/cfm/tfg.htm. The base transportation officer is responsible for maintaining the base information current in the MTMC database. Clearly state in notification procedures the NEWQD (and MCE if applicable), by hazard class/division, that can be received at unloading facilities (i.e., railheads, ports, hot cargo pads, etc).

★2.70.1. For emergency responses in vehicles without separate cargo compartments (i.e., Robot Vans, Metro type vehicles, HMMWV), EOD units are authorized to transport minimum essential quantities of all HC/Ds inside the vehicle. Separate the incompatible explosives to the maximum extent possible.

★2.74.14.3. Drivers must be qualified to operate the vehicle and knowledgeable of the explosives being transported and associated hazards. In addition, Air Force civilian drivers must have a Commercial Drivers License, with a hazardous materials endorsement, to transport explosives off a military installation. See AFI 24-301, *Vehicle Operations*.

★2.74.18.3. No restrictions are imposed on tractor maintenance when the tractor is separated by at least 100 feet from an explosives-loaded trailer.

★2.81.1. Don't use live munitions items for verification, validation, or electrical testing of aircraft or other weapons systems. This does not prevent the conduct of RDT&E and OT&E flight testing or "Built In Test" (BIT) checks or other low-current aircraft testing with live explosives installed, as long as doing so does not conflict with other USAF/DoD guidance, such as T.O. 11A-1-33. If inert munitions items are not available in the inventory, obtain MAJCOM approval prior to using live items. Provide MAJCOM a risk assessment that includes appropriate compensatory measures.

★**2.85. Support Facilities**. These include those facilities used to store, stage, or process large rocket motors and motor segments. The same facility may be used for both staging and processing these motors. Take thermal and toxic properties as well as potential explosive effects in accordance with applicable directives such as TM5-1300, *Structures to Resist the Effects of Accidental Explosions*, into consideration prior to selecting or constructing operational maintenance and staging facilities for large rocket motors and motor segments.

★3.2.1.1. Base Boundary. If a proposed PES would create an IBD clear zone extending beyond the base boundary, the hazard becomes a legal issue and the installation must obtain a restrictive easement from the land owner for the off-base land encumbered by the clear zone prior to establishing or constructing the PES. The only exception is if the area (land or water) is open and both manifestly unsuitable for habitation and for public gatherings. Only appropriate local government agencies for public safety, environment and health can declare land outside the base boundary unsuitable for habitation or public gatherings. Documentation determining this land unsuitable for habitation must be maintained with real property records. The commander, Facility Board, and facility user must be briefed and accept the need to reduce/eliminate NEW in the PES creating the clear zone to prevent a violation should a new encumbrance occur. The commander will designate personnel to perform a quarterly review of the area to ensure it remains open, uninhabited and unused and he should periodically reconsider obtaining a restrictive easement or purchasing the land. The commander, Facility Board, and facility user must be briefed and accept the need to reduce/eliminate NEW in the user's facility to prevent a violation should a new encumbrance occur before funding construction of the user's proposed facility. Upon DDESB-KO preliminary approval of the proposed site plan, the unit will secure the restrictive easement to prevent the encroachment from non-related personnel and facilities. Documentation substantiating the easement agreement will be submitted with the final approval request.

★3.2.1.1.1. (Added) Existing Restrictive Easements. Prior to establishing any PES that will have an explosives safety clear zone extending past the base boundary SE, CE, and JA representatives must review and ensure compliance with applicable in-place restrictive easement rights.

★3.2.1.9. High density public traffic routes. These routes are considered "high density" if they have 10,000 or more car and/or rail passengers per day, or 2,000 or more ship passengers per day. When making an estimate of traffic density, use the default value of two passengers per car. Traffic density shall be averaged over a normal (non-holiday) week in terms of the passengers during a 24-hour period. See Attachment 10 for additional guidance.

★3.2.1.10. Ground control approach (GCA), radar approach control (RAPCON), and air traffic control towers that support a joint use airfield (from all PESs). Use incremental IBD for GCA, RAPCON, and air traffic control towers that support a military use only airfield from non-flightline PES.

3.2.1.13. (Delete this paragraph)

3.2.1.14. (Delete this paragraph)

★3.2.2. Public Traffic Route (PTR) Distance. This is the minimum permissible distance between PESs and PTR exposures. For HC/D 1.1 and 1.2, it is normally 60% of inhabited building distance. PTR and IB for HC/D 1.3 and 1.4 are the same. Apply PTR separation to: (list is not all inclusive) (see Attachment 10 for additional guidance)

3.2.2.6. (Delete this paragraph)

★3.2.2.7. Medium traffic density. If routes have 400 or more, but less than 10,000 car and/or rail passengers per day, or 80 or more, but less than 2,000 ship passengers per day, then 60% of the specified minimum fragmentation distance for IB applies. Medium traffic density criteria apply, as a minimum, to recreational activity that is extensive and occurs on a regular basis. If routes have less than 400 car and/or rail passengers per day, or less than 80 ship passengers per day, then no minimum

fragmentation distance is required (this small number of passengers is considered low density). Minimum distance shall be based on blast criteria (K24/K30) only. See Attachment 10 for additional guidance.

★3.2.3.8. (Added). GCA, RAPCON, and air traffic control towers that support a military use only airfield from flightline PES.

★3.3.3. Partial calculated criteria to prevent breaching (intraline protection) based on a 12 inch reinforced concrete wall with explosives 3 feet off of floor (see Table 3.1).

★3.5.1.4. Explosives and munitions in HC/D 1.1 will also generally present a fragmentation hazard, either from the case of the explosive device or from the packaging or facility in which the explosives are stored. Unless otherwise specified, a minimum distance of 1,250 feet will be used to separate HC/D 1.1 explosives NEWs of 450 pounds or more from inhabited buildings. For NEWs between 31-450 pounds use Table 3.9 or 3.26. Some munitions items have been tested and demonstrated to have less than the specified 1,250 ft fragment hazard. In these instances, the minimum IBD will be given in parentheses where the hazard classification is listed, such as (07)1.1 for a 700-foot minimum IBD.

★3.5.4. Class/Division 1.4 (Moderate Fire, No Blast). These items present a fire hazard but no blast hazard. There is virtually no fragmentation or toxic hazard beyond the fire hazard clearance ordinarily specified for high-risk materials.

★3.10.4. Where explosives are outdoors on open vehicle or open railcars, measure distances to and from the explosives. This also applies to explosives carried externally on aircraft which are parked either in the open or inside approved lightweight shelters.

★3.10.7. Measure to the nearest point of a non-explosives location, building, aircraft or taxiway.

★3.10.14. Measure from the edge of facility pad if it will be used to hold munitions.

★3.10.15. (Added) Measure to edge of aircraft cargo hold for internally-loaded explosives.

★3.10.16. (Added) Measure to the edge of the roadway/pavement for PTRD.

★3.11.2.2. Specific minimum distances for HC/D 1.2.x and some HC/D 1.1 and 1.3 explosives. Based on testing or analogy, fragment distances have been determined for some specific stocklisted items. Specific minimum distances, when known, are shown in hundreds of feet by a numerical Figure (in parentheses) to the left of the HC/D designator. For example, (07)1.1 would indicate a HC/D 1.1 item with a 700-foot-minimum IB distance. Minimum PTR distance (paragraph 3.2.2.) would be 60 percent of 700 feet, or 420 feet.

★3.12.1. Protection against high-speed, low-angle fragments. Properly constructed or natural barricades provide protection against low angle fragments. Barricades or earth-covered structures eliminate the risk of propagating explosions caused by low-angle, high-speed fragments and should prevent simultaneous detonation of an explosion. Barricade elevation is effective when a straight line, drawn from a point described in paragraph 3.12.1.1 to a point described in paragraph 3.12.1.2, passes through the top width of the barricade. A barricade of this elevation should prevent simultaneous detonation of an explosion from one quantity of mass-detonating explosives to another (see Figure 3.2).

★3.12.1.2.1. The highest point of any exposure being protected.

3.12.1.2.4. (Delete this paragraph)

★3.12.4. Artificial Barricades. Select cohesive earth fill, free from unhealthy organic matter, trash, debris and frozen material. Don't use stones heavier than 10 pounds or larger than 6 inches and keep in the lower center of the barricade. Compact and prepare the surface to keep structural integrity and control erosion. Effective artificial barricades are:

★3.20.1. The separations shown in Table 3.16 provide reasonable assurance that aircraft in closed hardened shelters will remain operable should an explosion occur in an adjacent shelter or ready service storage facility. These aircraft may not be immediately removable due to debris. For shelters with third generation-type rear doors, the aircraft may be damaged substantially unless modifications have been made to prevent the rear doors from being blown against the aircraft.

★3.20.4. HASs used solely as permanent maintenance facilities would normally be classified as related facilities and require IL separation from supported PES (HAS containing combat configured aircraft, etc.). However, because TAB VEE and second and third generation HAS provide increased protection to equipment and personnel, the reduced separations shown in Table 3.16 are permitted with the following provisions:

★3.20.5. AIM-7, AIM-9, and AGM-65 missiles meeting the missile-to-missile separation requirements of paragraph 3.34 may use the separations in Table 3.18. For the AIM-7M with the WAU-17/B warhead, use Table 3.18, if no more than three warheads are in radial alignment. If necessary, store 20mm and 30mm ammunition with these missiles.

3.20.5.1. (Delete this paragraph)

3.20.5.2. (Delete this paragraph)

3.20.5.3. (Delete this paragraph)

★3.21.10. Site tri-service or joint use storage facilities under the standard criteria, DoD 6055.9. However, if operational requirements prescribe, austere area criteria apply to any part of the facility falling directly under Air Force control.

★3.21.6. Open Storage. Open storage is authorized for all HC/D of munitions and explosives. Give priority for cover to items requiring protection from the elements, considering the type packing material involved. Comply with Table 3.3 except for separation between open storage sites, pads, and modules (above ground magazines), used solely for the storage of non-mass detonating CBUs in metal containers and/or 20mm and 30mm ammunition in metal containers. Such locations will be separated from each other by a minimum distance of 70 feet for a maximum of 500,000 pounds NEW. All other normal Q-D requirements apply.

★3.22.4. Barricades must comply with the appropriate requirements of this chapter. Module barricades must comply with the 2-degree rule in paragraph 3.12.

3.24. (Delete this paragraph)

★3.25.2. Airfield Explosives-Prohibited Areas. Explosives, explosive facilities, and parked explosives-loaded aircraft will be excluded from Runway Clear Zones and Accident Potential Zones I and II. For rotary wing aircraft, do not site explosives or activities involving explosives within the Landing Lane Clear Zone and Accident Potential Zone. For further details, see AFMAN 32-1123 (I), *Airfield and Heliport Planning and Design*, AFI 32-7063, Air *Installation Compatible Use Zone Program*, and AFH 32-7084, *AICUZ Program Managers Guide*.

★3.25.4. ***EXCEPTION:*** Aircraft configured with the items listed below are exempt from Q-D site planning requirements when evaluated as a PES. This does not include ammunition and explosives carried as cargo. Park in a designated aircraft parking area meeting airfield criteria and treat the aircraft as explosives-loaded in all other respects. The following munitions can be uploaded and downloaded at the designated aircraft parking area provided that the quantity of munitions being loaded or unloaded is limited to a single aircraft load. Munitions delivery trailers (i.e., UALS, BDU, flare & chaff mods, captive-carry missiles) are considered in the transportation mode (QD-exempt) provided the trailers do not remain at the designated aircraft parking area longer than the loading/unloading operation being conducted.

★3.25.4.2. HC/D 1.3 Installed Aircraft Defensive Flares. Externally loaded munitions such as LUU-1/2 flares and 2.75" training rockets require Q-D.

★3.25.4.3. (Added) HC/D 1.4 munitions (i.e., chaff squibs, captive-carry training missiles, BDU-33s).

★3.25.4.4. (Added) Installed explosives necessary for safe flight operations. See glossary and TO 11A-1-33 for further information.

★3.25.5. Uploading and downloading of munitions will be conducted in explosives sited aircraft parking areas with the exceptions listed in paragraph 3.25.4 and its subparagraphs.

3.25.6. (Delete this paragraph)

3.27.1.6. (Delete this paragraph)

★3.27.1.1.4. (Added) Check environmental compliance and Resource Conservation and Recovery Act (RCRA) requirements and permits for this operation. For overseas locations, check Status of Forces Agreement and/or applicable technical agreements for any applicable environmental protection requirements.

★3.27.2.2. From burning areas to all locations involving personnel that are not essential to the planned burn, or for non-explosives related facilities apply K40 (1,250-foot minimum).

★3.28.1. Proficiency Ranges. Because the quantity of explosives required to maintain EOD proficiency is small, criteria for an EOD training range are not as stringent as required for actual disposal operations. Limit EOD training ranges to a maximum of 5 pounds of demolition explosives. Use only non-fragmenting charges (Boot Banger, bare C-4, Conical Liquid Follow Through, etc.), shaped charges (Mk 7 series, Mk 2, flex linear etc) explosive powered tools (Mk-2 dearmer, Percussion Actuated Non-electric Disruptor, etc). Explosively formed penetrators including but not limited to the Mk 23, Mk 24, and Mk 788 Main Charge Disruptor are not authorized for use. When siting these ranges, as an ES use incremental PTR distance from other PES based on the NEW of the other PESs. Construct and site as follows:

★3.28.1.7. (Added) If the proficiency training range is located on an existing disposal range and meets separation distance from the detonation point to the perimeter of the disposal range in accordance with the requirements listed in TO 11A-1-42, section 1, then barricades identified in paragraph 3.28.1.2 are not required.

★3.28.3.6. (Added) Stand-off disrupter.

★3.28.3.7. (Added) Stand-off dearmer.

★3.28.4.4. Twenty feet of standard detonating cord (DODIC M456).

★3.28.4.9. (Added) Five stand-off disrupter blank cartridges.

★3.28.4.10. (Added) Shock Tube as required.

★3.34. Tactical Missile Separations (see Table 3.26).

★3.34.3. AIM-7 Missiles with WAU-17 Warhead in an AURC. All missiles in an AURC will sympathetically detonate, therefore the MCE is all four warheads in the AURC (36 lbs x 4 or 144 lbs).

★3.34.4. When AIM-7 missiles (with WAU-17) are in the open or light structures that do not stop primary fragments, the hazardous fragment distance (IBD) varies with the number of warheads subject to sympathetic detonation (those in radial alignment and at less than 100 inches from each other) as follows:

# Warheads	IBD
1	280
2	565
3	770
4	955
5	1,120
6	1,245
≥7	1,250

★3.34.5. When AIM-7 missiles (with WAU-17) are in a heavy structure (other than ECMs) capable of stopping primary fragments, use Table 3.9 to determine the hazardous fragment distance. MCE is the total number of warheads in the structure, unless a lesser MCE is approved by AFSC/SEW. Heavy structures are those with a wall thickness ≥12 inches of reinforced concrete and a roof thickness >5.9 inches of reinforced concrete. For ECMs, use Table 3.26, Line 8.

★3.35.3.1. (Added) For F-16, Configuration 3, with only AIM-120A, AIM-120B, and AIM-120C1 through C3 missiles: NEWQD = 16.9 lbs, IMD = 29 ft, ILD = 47 ft, PTR = 300 ft, and IBD = 500 ft.

3.40.8. (Delete this paragraph)

3.40.9. (Delete this paragraph)

★3.41. (Added) 40mm Ammunition in Armories. Cartridges, 40mm, HEDP, M433 stored in CNU 541/E Containers (modified MK 387 MOD 0 containers with CEMCOM buffer liners) are hazard classified as HD 1.2.2, with an NEWQD of 0.102 pounds per cartridge. This hazard classification is for storage only. Cartridges may not be offered for transportation by commercial carriers in this packaging configuration.

★Table 3.2. Maximum HC/D 1.1, 1.2.1, and 1.2.2 Explosives Allowed.

★Table 3.3. Quantity Distance Criteria.

			HAZARD CLASS/DIVISION 1.1 (35)										
	COLUMN		1	2	3	4	5	6	7	8	9	10	
LINE	FROM: POTENTIAL EXPLOSIVES SITE (PES) TO: EXPOSED SITE (ES) (10)(72)(76)		EARTH COVERED IGLOO (1) SIDE (61)	EARTH COVERED IGLOO (1) REAR (61)	EARTH COVERED IGLOO (1) FRONT (5)(39)	BARRICADED MODULE (38)	ABOVE GROUND MAGAZINE UNBARRICADED (2) (3) (5)	ABOVE GROUND MAGAZINE BARRICADED (2) (3) (5)	OPERATING LOCATION REMOTELY CONTROLLED (76)	OPERATING LOCATION UNBARRICADED (46) (5)	OPERATING LOCATION BARRICADED (3) (46) (5)	MISSILE BATTERY DEFENSIVE	LINE
1	Side	7 Bar	K1.25 (14)	K1.25 (14)	K2.75 (14)	K4.5	K4.5	K4.5	K4.5	K4.5	K4.5	K4.5	1
		3 Bar	K1.25 (14)	K1.25 (14)	K2.75 (14)	K6	K6	K6	K6	K6	K6	K6	
	EARTH	Undef	K1.25 (63)	K1.25 (63)	K4.5 (63)	K6	K6	K6	K6	K6	K6	K6	
	COVERED	"	K2 (64)	K2 (64)	K6 (64)								
2	IGLOO (1)	7 Bar	K1.25 (14)	K1.25 (14)	K2	K4.5	K4.5	K4.5	K4.5	K4.5	K4.5	K4.5	2
		3 Bar	K1.25 (14)	K1.25 (14)	K2	K6	K6	K6	K6	K6	K6	K6	
	Rear	Undef	K1.25 (14)	K1.25 (14)	K2	K6	K6	K6	K6	K6	K6	K6	
3	Front	7 Bar	K2.75 (14)	K2	K6	K6	K6	K6	K6	K6	K6	K6	3
	(39)Unbarri	3 Bar	K4.5	K4.5	K9	K9	K9	K9	K9	K9	K9	K9	
	(5) -caded	Undef	K6	K6	K11	K11	K11	K11	K11	K11	K11	K11	
4	Front	7 Bar	K2.75 (14)	K2	K6	K6	K6	K6	K6	K6	K6	K6	4
	Barri	3 Bar	K4.5	K4.5	K6	K6	K6	K6	K6	K6	K6	K6	
	-caded	Undef	K6	K6	K6	K6	K6	K6	K6	K6	K6	K6	
5	ABOVE GROUND MAGAZINE UNBARRICADED (2)		K6	K6	K11 (7)	K6	K11 (78)	K6	K11	K11	K6	K11 (7)	5
6	ABOVE GROUND MAGAZINE BARRICADED (2) (3)(5)		K6	K6	K6	K6	K6	K6	K6	K6	K6	K6	6
7	BARRICADED MODULE (38)		K1.25 (14)	K1.25 (14)	K6	K1.1 (4)	K6	K6	K6	K6	K6	K6	7
8	OPERATING LOCATION UNBARRICADED		K18 (6) (61)	K18 (6) (61)	K18 (61)	K18 (6)	K18	K18 (6)	K24	K18	K18 (6)	K18	8
9	OPERATING LOCATION BARRICADED (3) (5)		K18 (6) (61)	K18 (6) (61)	K18 (6) (61)	K18 (6)	K18 (6)	K18 (6)	K24	K18 (6)	K18 (6)	K18 (6)	9
10	COMBAT AIRCRAFT PARKING AREA (65)		K30	K30	K30	K30	K30	K30	K30	K30	K30	K30 (7)(23)(68)	10
11	AIRCRAFT EXPLOSIVES CARGO (32) PARKING AREA		K6 (68)	K6 (68)	K11 (7)(68)	K6 (68)	K11 (7)(68)	K6 (68)	K30	K11 (7)(68)	K6 (68)	K11 (7)(23)(68)	11
12	FLIGHTLINE MUNITIONS HOLDING AREA		K6	K6	K11 (7)	K6	K11 (7)	K6	K24	K11 (7)	K6	K11 (7)	12
13	HARDENED AIRCRAFT SHELTER (12) (37)		K5 (51)	K5 (51)	K8 (51)	K8 (51)	K8 (51)	K8 (51)	K24	K8 (51)	K8 (51)	K18 (50)	13
14	DEFENSIVE MISSILE BATTERY		K6	K6	K11 (7)	K6	K11 (7)	K6	K24	K11 (7)	K6	K11 (7)	14
	COLUMN		1	2	3	4	5	6	7	8	9	10	

★**Table 3.3. Continued.**

	Hazard Class/Division 1.1 (35)					Hazard Class/Division				HC/D	HC/D	
	11	12	13	14	15	16	17	18	19	20	21	
LINE	COMBAT AIRCRAFT PARKING AREA (18)(37) (67)	AIRCRAFT EXPLOSIVE CARGO PARKING AREA (32)	FLIGHT-LINE MUNITIONS HOLDING AREA	HARDENED AIRCRAFT SHELTER (EXCEPT 3RD GENERATION (12) (37)(70)	HARDENED AIRCRAFT SHELTER 3RD GENERATION (12) (37)(70)	ALL TYPES OF POTENTIAL EXPLOSION SITES (11) (13)(57)(73)(78) 1.2.1 MCE ≥100 lbs	1.2.1 MCE <100 lbs	1.2.2	(xx)1.2.3 (74)	ALL TYPES OF POTENTIAL EXPLOSION SITES (13) (21) (31)(55)(76)	ALL TYPES OF POTENTIAL EXPLOSION SITES (13)(19) (20)	LINE
1	K4.5	K4.5	K4.5	K4.5	K4.5	50' MIN (26)	50' MIN (26)	50' MIN (26)	50' MIN (26)	(58)	50' MIN (26)	1
	K6	K6	K6	K6	K6							
	K6	K6	K6	K6	K6							
2	K4.5	K4.5	K4.5	K4.5	K4.5	50' MIN (26)	50' MIN (26)	50' MIN (26)	50' MIN (26)	(58)	50' MIN (26)	2
	K6	K6	K6	K6	K6							
	K6	K6	K6	K6	K6							
3	K6	K6	K6	K6	K6	50' MIN (26)	50' MIN (26)	50' MIN (26)	50' MIN (26)	(58)	50' MIN (26)	3
	K9	K9	K9	K9	K9							
	K11	K11	K11	K11	K11	300' MIN	200' MIN	100' MIN				
4	K6	K6	K6	K6	K6	50' MIN (26)	50' MIN (26)	50' MIN (26)	50' MIN (26)	(58)	50' MIN (26)	4
	K6	K6	K6	K6	K6							
	K6	K6	K6	K6	K6							
5	K11 (7)	K11 (7)	K11 (7)	K11 (8)	K11 (8)	300' MIN (16)(75) (78)	200' MIN (16)(75) (78)	100' MIN (16)(75) (78)	50' MIN (26) (75)(78)	(58) (78)	50' MIN (26)	5
6	K6	K6	K6	K6	K6	300' MIN (16)(75)	200' MIN (16)(75)	100' MIN (16)(75)	50' MIN (26) (75)	(58)	50' MIN (26)	6
7	K6	K6	K6	K6	K6	300' MIN (16)	200' MIN (16)	100' MIN (16)	50' MIN (26)	(58)	50' MIN (26)	7
8	K18	K18 (6)	K18 (6)	K18 300' MIN (6)(40)(41)	IL (62)	T3.8/3.9 IL 300' MIN (77)	T3.8 IL 200' MIN (77)	T3.10 IL 100' MIN	T3.13 .36(IB) 50' MIN (26)	(58)	50' MIN (26)	8
9	K18	K18 (6)	K18 (6)	K18 300' MIN (6)(40)(41)	IL (62)	T3.8/3.9 IL 300' MIN (77)	T3.8 IL 200' MIN (77)	T3.10 IL 100' MIN	T3.13 .36(IB) 50' MIN (26)	(58)	50' MIN (26)	9
10	K18 (7)(22)(23)(68)	K30 (7)(23)(68)	K30 (7)(23)(68)	K30 (8)(23)(68)	K30 (8)(23)(68)	300' MIN (17)(77)	200' MIN (17)(77)	100' MIN (17)	50' MIN (17)	(59) (17)	50' MIN (26)(29) (17)	10
11	K11 (7) (68)	K11 (7)(68)	K11 (7)(68)	K11 (8)(68)	K11 (8) (68)	300' MIN (17)	200' MIN (17)	100' MIN (17)	50' MIN (17)	(58) (17)	50' MIN (26)(29) (17)	11
12	K11 (7)	K11 (7)	K11 (7)	USE TABLE 3.17	USE TABLE 3.17	300' MIN (16)(17)	200' MIN (16)(17)	100' MIN (16)(17)	50' MIN (17)	(58) (17)	50' MIN (26) (17)	12
13	K18 (50)	K18 (50)	SEE PARA 3.20	SEE PARA 3.20	SEE PARA 3.20	300' MIN (16)(17)	200' MIN (16)(17)	100' MIN (16)(17)	50' MIN (17)(26)	(58)) (17)	50' MIN (17)	13
14	K11 (7)	K11 (7)	K11 (7)	K11 (8)	K11 (8)	300' MIN (16)	200' MIN (16)	100' MIN (16)	50' MIN	(58)	50' MIN (26)	14
	11	12	13	14	15	16	17	18	19	20	21	

★**Table 3.3. Continued.**

HAZARD CLASS/DIVISION 1.1

LINE	COLUMN		1	2	3	4	5	6	7	8	9	10	LINE
	FROM: POTENTIAL EXPLOSIVES SITE (PES) / TO: EXPOSED SITE (ES) (72)(76)		EARTH COVERED IGLOO (1)			BARRI-CADED MODULE	ABOVE GROUND MAGAZINE	ABOVE GROUND MAGAZINE	OPERATING LOCATION REMOTELY CONTROLLED	OPERATING LOCATION UNBARRI-CADED	OPERATING LOCATION BARRI-CADED	MISSILE BATTERY DEFENSIVE	
			SIDE (61)	REAR (61)	FRONT (5)(39)	(38)	UNBARRI-CADED (2) (3) (5)	BARRI-CADED (2) (3) (5)	(76)	(46) (5)	(3) (46) (5)		
15	AIRFIELD MILITARY USE ONLY (66)	WAY	K21/30 750' MIN (30)	K15/30 750' MIN (30)	K21/30 750'MIN (30)	K24/30 750'MIN (30)	K24/30 750'MIN (30)	K24/30 750'MIN (30)	K24/30 750'MIN	K24/30 750'MIN (30)	K24/30 750'MIN (30)	NONE REQUIRED	15
16		*TAXI* WAY	K18 (30)	K18 (30)	K21/30 750' MIN (30)	K24/30 750'MIN (30)	K24/30 750'MIN (30)	K24/30 750'MIN (30)	K24/30 750'MIN	K24/30 750'MIN (30)	K24/30 750'MIN (30)	NONE REQUIRED	16
17	AIRFIELD, JOINT MILITARY/ NON MILITARY USE (66)	RUN-WAY	K35/50 1250'MIN (47) (52)	K25/50 1250'MIN (47) (52)	K35/50 1250'MIN (47) (52)	K40/50 1250'MIN (47)	K40/50 1250'MIN (47)	K40/50 1250'MIN (47)	K40/50 1250'MIN	K40/50 1250'MIN (47)	K40/50 1250'MIN (47)	K40/50 1250'MIN	17
18		TAXI WAY	K21/30 750'MIN (48) (53)	K15/30 750'MIN (48) (53)	K21/30 750'MIN (48) (53)	K24/30 750'MIN (48)	K24/30 750'MIN (48)	K24/30 750'MIN (48)	K24/30 750'MIN	K24/30 750'MIN (48)	K24/30 750'MIN (48)	K24/30 750'MIN	18
19	NON-EXPLOSIVES LOADED AIRCRAFT (79)		K35/50 1250'MIN (42)(47)(52)	K25/50 1250'MIN (42)(47)(52)	K35/50 1250'MIN (42)(47)(52)	K40/50 1250'MIN (42) (47)	K40/50 1250'MIN (42) (47)	K40/50 1250'MIN (42) (47)	K40/50 1250'MIN	K40/50 1250'MIN (42) (47)	K40/50 1250'MIN (42) (47)	K30 (43)	19
20	PASSENGER LOAD/UNLOAD AREA (45)		K21/30 750'MIN (48) (53)	K15/30 750'MIN (48) (53)	K21/30 750'MIN (48) (53)	K24/30 750'MIN (48)	K24/30 750'MIN (48)	K24/30 750'MIN (48)	K24/30 750'MIN	K24/30 750'MIN (48)	K24/30 750'MIN (48)	K30	20
21	FACILITIES FOR COMBAT A/C ALERT FORCES (49)		K18 (61)	K18 (61)	K18 (61)	K18	K18	K18	K24	K18	K18	K18	21
22	ABOVE GROUND UTILITIES (6)(24)		K21/30 750'MIN (48) (53)	K15/30 750'MIN (48) (53)	K21/30 750'MIN (48) (53)	K24/30 750'MIN (48)	K24/30 750'MIN (48)	K24/30 750'MIN (48)	K24/30 750'MIN	K24/30 750'MIN (48)	K24/30 750'MIN (48)	K24/30 750'MIN	22
23	UNDERGROUND UTILITIES & BULK POL FACILITIES (24)(44)		K3 80' MIN	K3 80' MIN	K3 80' MIN	K3 80' MIN	K3 80' MIN	K3 80' MIN	K3 80' MIN	K3 80' MIN	K3 80' MIN	K3 80' MIN	23
24	ABOVE GROUND BULK POL FACILITIES (44)		K35/50 1250'MIN (47) (54)	K25/50 1250'MIN (47) (54)	K35/50 1250'MIN (47) (54)	K40/50 1250'MIN (47)	K40/50 1250'MIN (47)	K40/50 1250'MIN (47)	K40/50 1250'MIN	K40/50 1250'MIN (47)	K40/50 1250'MIN (47)	K40/50 1250'MIN	24
25	PUBLIC TRAFFIC ROUTE (9)		K21/30 750'MIN (48) (53)	K15/30 750'MIN (48) (53)	K21/30 750'MIN (48) (53)	K24/30 750'MIN (48)	K24/30 750'MIN (48)	K24/30 750'MIN (48)	K24/30 750'MIN	K24/30 750'MIN (48)	K24/30 750'MIN (48)	K24/30 750'MIN	25
26	RECREATION AREA/ FACILITY (34)		K21/30 750'MIN (48) (53)	K15/30 750'MIN (48) (53)	K21/30 750'MIN (48) (53)	K24/30 750'MIN (48)	K24/30 750'MIN (48)	K24/30 750'MIN (48)	K24/30 750'MIN	K24/30 750'MIN (48)	K24/30 750'MIN (48)	K24/30 750'MIN	26
27	RELATED FACILITY (36)		K18 (6)(41)(61)	K18 (6)(41)(61)	K18 (6)(41)(61)	K18 (6) (41)	K18 (6) (41)	K18 (6) (41)	K24	K18 (6) (41)	K18 (6) (41)	K18 (6) (41)	27
28	INHABITED BUILDING (60) (33)		K35/50 1250'MIN (47) (52)	K25/50 1250'MIN (47) (52)	K35/50 1250'MIN (47) (52)	K40/50 1250'MIN (47)	K40/50 1250'MIN (47)	K40/50 1250'MIN (47)	K40/50 1250'MIN	K40/50 1250'MIN (47)	K40/50 1250'MIN (47)	K40/50 1250'MIN	28
	COLUMN		1	2	3	4	5	6	7	8	9	10	

★**Table 3.3. Continued.**

	Hazard Class/Division 1.1 (35)					Hazard Class/Division				HC/D	HC/D	
	11	12	13	14	15	16	17	18	19	20	21	
LINE	COMBAT AIRCRAFT PARKING AREA (18)(37) (67)	AIRCRAFT EXPLOSIVE CARGO PARKING AREA (32)	FLIGHT-LINE MUNITIONS HOLDING AREA (30)	HARDENED AIRCRAFT SHELTER (EXCEPT 3RD GENERATION (12)(13) (37)(70)	HARDENED AIRCRAFT SHELTER 3RD GENERATION (12)(13) (37)(70)	ALL TYPES OF POTENTIAL EXPLOSION SITES (11)(13)(57)(73)(78) 1.2.1 MCE ≥100 lbs	1.2.1 MCE <100 lbs	1.2.2	(xx)1.2.3 (74)	ALL TYPES OF POTENTIAL EXPLOSION SITES (13) (21) (31)(55)(76)	ALL TYPES OF POTENTIAL EXPLOSION SITES (13)(19) (20)	LINE
15	NONE REQUIRED (56)	NONE REQUIRED (56)	NONE REQUIRED (56)	NONE REQUIRED (56)	NONE REQUIRED (56)	T3.8/3.9 PTR 300' MIN (17)(30)(77)	T3.8 PTR 200' MIN (17)(30)(77)	T3.10 PTR 100' MIN (17)(30)	T3.13 .6(IB) (17)(30)	17)(30) (59)	100' MIN (17)(15)	15
16	NONE REQUIRED (56)	NONE REQUIRED (56)	NONE REQUIRED (56)	NONE REQUIRED (56)	NONE REQUIRED (12)(56)	T3.8/3.9 PTR 300' MIN (17)(27)(30)(77	T3.8 PTR 200' MIN (17) (27)(30)(77)	T3.10 PTR 100' MIN (17)(27)(30)	T3.13 .6(IB) (17)(27)(30)	(17)(30) (59)	100' MIN (17)(15)	16
17	K40/50 1250'MIN (47)	K40/50 1250'MIN (47)	K40/50 1250'MIN (47)	K40 REAR K62 SIDE K50 FRONT (40)	IB (62)	T3.8/3.9 IB 300' MIN (77)	T3.8/ IB 200' MIN (77)	T3.10 IB 100' MIN	T3.13 IB (xx) MIN	(59)	100' MIN (15)	17
18	K24/30 750'MIN (48)	K24/30 750'MIN (48)	K24/30 750'MIN (48)	K24/30 REAR K37 SIDE K30 FRT (40)	PTR (62)	T3.8/3.9 PTR 300' MIN (77)	T3.8 PTR 200' MIN (77)	T3.10 PTR 100' MIN	T3.13 .6(IB)	(59)	100' MIN (15)	18
19	K40/50 1250'MIN (43)(47)	K40/50 1250'MIN (43)(47)	K40/50 1250'MIN (43)(47)	K40 REAR K62 SIDE K50 FRONT (40)	IB (62)	T3.8/3.9 IB 300' MIN (43)(77)	T3.8 IB 200' MIN (43)(77)	T3.10 IB 100' MIN (43)	T3.13 IB (xx) MIN (43)	(43) (59)	100' MIN (15)(43)	19
20	K24/30 750'MIN (48)	K24/30 750'MIN (48)	K24/30 750'MIN (48)	K24/30 REAR K37 SIDE K30 FRT (40)	PTR (62)	T3.8/3.9 PTR 300' MIN (77)	T3.8 PTR 200' MIN (77)	T3.10 PTR 100' MIN	T3.13 .6(IB)	(59)	100' MIN (15)	20
21	K18 (6)	K18 (6)	K18 (6)	K18 300' MIN (6)(40)(41)	IL (62)	T3.8/3.9 IL (77) 300' MIN	T3.8 IL (77) 200' MIN	T3.10 IL 100' MIN	T3.13 .36(IB) 50' MIN (26)	(58)	50' MIN (26)	21
22	K24/30 750'MIN (48)	K24/30 750'MIN (48)	K24/30 750'MIN (48)	K24/30 REAR K37 SIDE K30 FRT (40)	PTR (62)	T3.8/3.9 PTR 300' MIN (77)	T3.8 PTR 200' MIN (77)	T3.10 PTR 100' MIN	T3.13 .6(IB)	(59)	50' MIN	22
23	K3 80' MIN	K3 80' MIN	K3 80' MIN	K3 80' MIN	K3 80' MIN	80' MIN (69)	80' MIN (69)	80' MIN (69)	80' MIN (69)	80' MIN (69)	50' MIN (69)	23
24	K40/50 1250'MIN (47)	K40/50 1250'MIN (47)	K40/50 1250'MIN (47)	K40 REAR K62 SIDE K50 FRONT (40)	IB (62)	T3.8/3.9 IB 300' MIN (77)	T3.8 IB 200' MIN (77)	T3.10 IB 100' MIN	T3.13 IB (xx) MIN	100' MIN (29)(59)	100' MIN (15)(28)	24
25	K24/30 750'MIN (48)	K24/30 750'MIN (48)	K24/30 750'MIN (48)	K24/30 REAR K37 SIDE K30 FRT (40)	PTR (62)	T3.8/3.9 PTR 300' MIN (77)	T3.8 PTR 200' MIN (77)	T3.10 PTR 100' MIN	T3.13 .6(IB)	(59)	100' MIN (15)	25
26	K24/30 750'MIN (48)	K24/30 750'MIN (48)	K24/30 750'MIN (48)	K24/30 REAR K37 SIDE K30 FRT (40)	PTR at (62)	T3.8/3.9 PTR 300' MIN (77)	T3.8 PTR 200' MIN (77)	T3.10 PTR 100' MIN	T3.13 .6(IB)	(59)	100' MIN (15)	26
27	K18 (6)(41)	K18 (6)(41)	K18 (6)(41)	K18 300' MIN (6)(40)(41)	IL (62)	T3.8/3.9 IL 300' MIN (77)	T3.8 IL 200' MIN (77)	T3.10 IL 100' MIN	T3.13 .36(IB) 50' MIN (26)	(58)	50' MIN (26)	27
28	K40/50 1250'MIN (47)	K40/50 1250'MIN (47)	K40/50 1250'MIN (47)	K40 REAR K62 SIDE K50 FRONT (40)	IB (62)	T3.8/3.9 IB 300' MIN (77)	T3.8 IB 200' MIN (77)	T3.10 IB 100' MIN	T3.13 IB (xx) MIN	(59)	100' MIN (15)	28
	11	12	13	14	15	16	17	18	19	20	21	

NOTES:

1. To use this criteria, earth-covered igloos constructed/sited prior to February 1999 must meet the requirements of paragraph 3.2 and the definition of "earth-covered magazine" in Attachment 1. Non-standard constructed/sited prior to February 1999 for explosives weights not exceeding 250,000 pounds remain valid (see paragraph 1.2.3). Future sitings must reflect the appropriate criteria.
2. Includes open air munitions stocks, light structures (for example, some Butler buildings), and trucks, trailers or railcars loaded with explosives. See paragraph 3.16.1 for vehicle inspection point criteria. Also includes modules, see paragraphs 3.22 through 3.24.
3. Barricades must meet the requirements of paragraph 3.12. For igloos the barricades in front of these structures will count for Q-D purposes only when the facility is being looked at as an ES; for these facilities, no credit is given for a front barricaded PES.
4. K1.1 is the minimum separation permitted between stacks of explosives in adjacent barricaded cells within a module and between adjacent barricaded modules. Cells containing structures heavier than metal Butler-type buildings require K6 barricaded and K11 unbarricaded to all other cells containing HC/D 1.1 explosives.
5. For barricading consideration see paragraph 3.12.8 magazines as Barricaded Structures.
6. Continue to use K9 to properly barricaded facilities sited at K9 before 1 June 1980 until a revised siting of that facility is necessary, except as noted below. K18 separations, or reduced intraline distances from earth-covered igloos in Table 3.7 are required for new or revised sitings. Barricades should continue to be used in designing new facilities to limit fragment damage. Continue to use K9 for the following properly barricaded facilities.
   a. Hardened response force tactical facilities (RFTF). No barricade is required to use K9 for RFTFs.
   b. Facilities of a tactical missile site (from the missiles of the Tactical Missile Site to its manned facilities; also applies to Defensive Missile Batteries).
   c. Field operations in magazine areas when performing minor maintenance, packaging or surveillance inspections from adjacent magazines.
   d. Unoccupied auxiliary power facilities, transformer stations, water treatment and pollution abatement facilities and other utilities that serve the PES and are not an integral function in the PES. Loss must not create an immediate secondary hazard. These applications need not be barricaded. *Exceptions*: Unoccupied power plants or transformers that exclusively support an explosives area or facility may be separated according NFPA standards. Transformers that directly support a single PES requires no separation.
7. Use K6 if a barricade meeting the requirements of paragraph 3.12.1 is between the PES and the ES.
8. Use K11 where no revetment wall or barricade protects the ES from the PES. Use K6 where a revetment wall or barricade protects the ES from the PES. No credit is allowed for a shelter wall on a PES.
9. See paragraph 3.2 for additional exposures requiring PTR separation.

★10. MILVAN/ISO container stuffing and unstuffing in a magazine area or munitions storage area are permitted at intermagazine distances.

11. Items in this division present a risk of propagation to adjacent aboveground magazines, particularly when packed in combustible containers. Distances shown are not to be reduced by the presence of barricades or earth cover. Storage in earth-covered igloos is preferred.
12. Separations are based on shelter doors remaining closed, except for aircraft towing, fueling, servicing, run up, or taxi and during integrated combat turnarounds or short periods when maintenance equipment or munitions are being moved into or out of shelters. If doors are left open for extended periods, normal combat aircraft parking area criteria apply out the front.

★13. A HAS sited for HC/D 1.2.x (MCE <100 lbs for HC/D 1.2.1), 1.3 or 1.4 explosives doesn't generate a Q-D clear zone except out the front. See FN 15 for additional HC/D 1.4 guidance. For HC/D 1.2.1 (MCE≥100), such as HC/D 1.2 CBUs, Durandals, AGM 88s, and 2.75" WP rockets, see Table 3.3, Col 16.

14. When required in austere areas (paragraph 3.21), reduce K1.25 to K1.1; reduce K2.75 to K2.5 when limiting igloo contents to those items listed in paragraph 3.23.2.

★15. HC/D 1.4S items may be stored (including associated handling) without regard to Q-D criteria. IBD and PTR will be 75 feet instead of 100 feet for quantities of HC/D 1.4 (other than compatibility group S) for quantities <3000 pounds. IBD and PTR will remain at 100 feet for quantities >3000 pounds. Fire separation distance of 50 feet is required out the sides and rear of earth-covered igloos (except to other igloo side/rear relationships). Out the front of earth-covered igloos 75 feet or 100 feet, as applicable, will be required. All other magazines will apply 75 feet or 100 feet IBD/PTR clear zones as applicable.

16. See paragraph 3.24 for reduced separations for austere area storage of non mass-detonating CBUs and 20 and 30 mm ammunition.

★17. If PES is a combat aircraft parking area, flightline munitions holding area, HAS, or explosives loaded cargo aircraft parking area, no separation is necessary unless the MAJCOM has determined Q-D application is necessary for aircraft survivability. If PES is a non-flightline PES such as a MSA, then use PTR (exception: from MSA PES to an explosives-loaded cargo aircraft parking area ES, use IMD), unless the MAJCOM has determined Q-D application is necessary for aircraft survivability. If aircraft survivability is the objective from any PES, use 1.2x IBD. See Tables 3.8, 3.9, 3.10, and

3.13 for 1.2.x PTR/IBD as applicable. For aircraft parked inside of a HAS hazarded by 1.2x PES, also use IBD but only consider line-of-sight frontal exposure. A HAS with door normally kept closed and acting as an ES is considered adequate for aircraft survivability. If the MAJCOM chooses not to apply any Q-D separation, they (or wing representative) must inform the commander owning the assets (exposed sites) of the fragmentation hazards of the applicable 1.2x PESs. If PES is a defensive missile battery use IM separation. See paragraphs 3.25.4 and 3.25.5 for HC/D 1.3 and 1.4 guidance.
18. Aircraft undergoing end-of-runway arming or dearming are considered in the transportation mode and are exempt from Q-D.
★19. Greater than 3,000 pounds of HC/D 1.4 may be sited at 50 feet (100 feet if the ES is of combustible construction) from all other magazines or explosives operating locations regardless of the HC/D or quantity of explosives authorized in the adjacent structures. The responsible commander must accept the fact that an explosion in adjacent structures could result in loss of the HC/D 1.4 stocks and the storage structure. The commander's risk acceptance must be documented by letter (i.e., signed by the commander stating he/she understands and accepts the potential loss of HC/D 1.4 stocks and the storage structure) and this letter must be submitted as part of the explosives site plan request package. Earth-covered structures may be filled to physical capacity with HC/D 1.4 explosives without requirement for separation to other facilities. See FN 15 for additional guidance.
20. When required for operational necessity, store limited quantities of HC/D 1.4 items without regard for Q-D. See paragraph 2.35 for licensing requirements.
★21. For reasons of operational necessity, 100-pounds NEWQD or less of HC/D 1.3 items may be stored at a licensed location without regard for Q-D. See paragraph 2.35 for licensing requirements.
★22. When parking explosives-loaded combat aircraft at less than intermagazine distance between aircraft within a group, obtain approval from at least the Numbered Air Force (NAF) Vice Commander owning the exposed aircraft (except for ARMCO revetted cells containing two aircraft). If grouping is required for support of a Unified Commander, the Major Air Component Vice Commander having operational control of the aircraft will be the lowest approval. Use K18 between groups. Intervening barricades, although recommended, don't reduce the required separation between groups. With NAF approval, K11 between groups may be used for contingency operations. See paragraph 3.25 for additional parking criteria. For approved aircraft configurations in a CAPA, see Figure 3.7 and 3.8 and paragraph 3.35.
★23. K30 is required to provide aircraft survivability from blast overpressure. This distance may be reduced to K11 if commanders responsible for the aircraft are advised of and accept the additional risk if aircraft are parked at less than K30.
★24. See definition of "Utilities" in Attachment 1. If the exposure does not meet the definition of utility, identify the exposure as a service line (see paragraph 2.48). Paragraph 3.13 contains additional guidance on separations required for specific utilities. Refer to paragraph 3.19 for additional Q-D guidance on electrical utilities. Use paragraph 2.23 for storage of water for fire fighting. Locate all unprotected water towers and above ground water tanks, whose loss is unacceptable, a minimum of inhabited building distance (IBD) from explosives locations. If loss of the water tower is acceptable, no Q-D is required. Locate tanks and reservoirs below ground level at underground POL separations. Manned or critical environmental exposures such as, operable units, monitoring and test wells that must be located in an explosive clear zone must be separated from a PES by incremental PTR. Other unmanned or non-critical environmental exposures require no separation. Underground electrical and communications lines may be sited at incremental K3 with no minimum required.
★25. Reserved for future use.
★26. A 75 or 100 foot separation distance, as applicable, must be used to an ES of combustible construction. Wood frame structures are an example of combustible construction. Concrete, masonry, and metal structures are examples of non-combustible construction.
27. No Q-D separation is necessary between an explosives-loaded aircraft parking area and the taxiways exclusively serving or constructed as part of the area.
★28. At least 50 feet from combat aircraft parking areas and aircraft explosives cargo parking areas for quantities >3000 pounds (excluding HC/D 1.4S items). Use 75' for <3000 pounds or 100' for >3000 pounds for all other PESs (excluding HC/D 1.4S items).
★29. The 75 or 100-foot separation distance, as applicable, does not apply to combat aircraft parking areas and aircraft explosives cargo parking areas. All other requirements apply.
★30. When required at overseas locations only, use K4.5 (750 min doesn't apply) for HC/D 1.1 PES's and 125 feet for non-mass-detonating PESs. In NATO, use the equation: $D=1.8Q^{1/3}$, where D is the distance in meters and Q equals the NEW in kilograms. The use of these reduced separations depends on operational necessity, providing the commander accepts the transient risk to military aircraft movements. If siting facilities, the MAJCOM/CC or CV must provide HQ AFSC/SE a letter listing all bases at which these distances will apply and state acceptance of transient risk to military aircraft movements.
31. For intentional static firing for shelf life testing or similar operations see paragraph 3.27.3.
32. No Q-D separation is necessary from explosives-loaded cargo aircraft when parked 24 hours or less for refueling, servicing, crew rest or change, or maintenance performed under TO 11A-1-33, Handling and Maintenance of Explosives Loaded Aircraft, (applies with all HC/Ds). Keep the aircraft under constant surveillance and do not load, unload, or handle explosives. Park these aircraft on the hot cargo pad. When this is not possible, park as remotely as practical from other explosives or populated areas. Comply with minimum airfield criteria in AFH 32-1084.
33. See paragraph 3.2.1 for additional exposures requiring IBD separation.

34. Use the listed distances for recreational areas in the open, such as golf courses or tennis courts without structures. Use inhabited building separation where structures, including bleachers, are part of the facility (such as indoor tennis courts or golf clubhouses). No separation is necessary to recreational areas used exclusively by personnel supporting the PES, however, use IL separation from other related PESs.
35. For class division 1.5 items, use C/D 1.1 criteria.
★36. See paragraph 3.13 for additional information and specific requirements. For non-explosive War Reserve Materiel (WRM) see paragraph 3.17 and 3.18. For hardened facility criteria see paragraph 3.11.6.
★37. See paragraph 3.20 for additional information and specific requirements. Use combat aircraft parking area criteria for steel bin revetments and the unhardened front or rear of Korean TAB VEE or Flowthru shelters. See Table 3.16. For HC/Ds 1.2, 1.3, and 1.4, use intermagazine separation to protect HAS and maintenance HAS from unrelated PES (such as operating locations, igloos, and above ground magazines). See footnote 17 if aircraft survivability is required.
★38. Separations shown apply to side, rear, and barricaded front exposures. For exposures to or from the unbarricaded front of a module, use unbarricaded aboveground magazine criteria. K1.1 is the minimum separation authorized between stacks of munitions in adjacent cells and modules. See paragraphs 3.22 and 3.23 for additional guidance concerning modules.
39. Consider the front of an igloo unbarricaded within 60 degrees from either side of the door centerline unless a barricade meeting the requirements of paragraph 3.12 protects the igloo.
40. Applies to all class/division 1.1 munitions except AIM-7, AIM-9, and AGM-65 missiles. See paragraph 3.20.5.3 for separation distances for these items. Only 50-foot separation is necessary from the sides or rear of the HAS (other than 3rd Generation) for 500 pounds NEW or less.
41. Use the minimum IL distance for specific items and situations in paragraph 3.39 (Table 3.26).
42. Criteria shown apply to nonmilitary aircraft. Use incremental K30 to military non-explosives loaded aircraft. MAJCOMs may require greater protection for unique mission or high value airframes.
43. Q-D separations to non-explosives military aircraft parking areas from combat aircraft parking areas, flightline munitions holding areas, and explosives cargo aircraft parking areas are a MAJCOM responsibility. Refer to paragraph 3.13.3.1 for collocating combat operations.
44. Consider cut and cover POL tanks as underground. Site berm fuel bladders at incremental K40/50 distance with a minimum 400 feet from the PES supported. Q-D from igloos is K35/50 for fronts and sides and K25/50 for rears. (Fuel bladders must be fueled from trucks, underground lines or aboveground lines that have automatic shutoffs.) These standards apply only to bulk POL and the supply lines supporting the storage location. All other fuel systems will be constructed according to NFPA and national consensus standards.
45. Applies to open locations where passengers enplane or deplane. For structures where passengers assemble, such as terminal buildings, use IB distance.
46. See paragraph 3.14 for specific criteria for rocket storage, checkout and assembly buildings.
47. Use the minimum IB distance for specific items and situations (paragraphs 3.32 through 3.39) or authorized under paragraph 3.11 in place of the 1,250-foot minimum distance.
48. Use the minimum PTR distance for specific items and situations (paragraphs 3.32 through 3.39) or authorized under paragraph 3.11 in place of the 750-foot minimum distance.
★49. Alert force facilities which house alert crews and essential support personnel for alert aircraft, may be sited at less than K18 if equivalent protection is provided by substantial dividing walls and blast doors. Use greater separation where response time will permit. See Note 76 if the PES hazarding the alert facility is for remotely controlled operations.
50. Use K2.75 to protect against simultaneous detonation. Use K6 barricaded and K9 unbarricaded to the front of a TAB VEE or TAB VEE Modified. Use K8 to maintenance HAS or for aircraft and shelter survival. However, survival criteria to the front of a TAB VEE or modified TAB VEE is K18.
51. All munitions storage area PESs to TAB VEE fronts will apply K 18 if serviceability status of the doors allows them to be closed when aircraft are inside. Otherwise, apply K30 criteria to TAB VEE fronts.
52. K-factors shown apply to 26- by 60-feet or larger igloos. For smaller igloos, use K40/50.
53. K-factors shown apply to 26- by 60-feet or larger igloos. For smaller igloos, use K24/30.
★54. K-factors shown apply to 26- by 60-feet or larger igloos. For smaller igloos, use K40/50.
55. When necessary, fill earth-covered igloos to their physical capacity for HC/D 1.3, provided the igloos are properly sited for at least 100 pounds of HC/D 1.1 material.
★56. No explosives safety separation required. Apply airfield safety criteria (see paragraph 3.25).
★57. For front exposures from all earth covered igloos acting as a PES, use Table 3.3 columns 16, 17, 18, or 19. For side and rear exposures from all earth covered igloos acting as a PES, use Table 3.12.
58. Use Table 3.13, IM and IL column.
59. Use Table 3.13, PTR and IB column.
60. For sparsely populated locations, reduce the minimum 1,250-foot fragment distance to 900 feet [270 meters (m)] if the PES does not exceed 11,400 pounds (5,140 kg). Allow no more than 25 persons in any sector bounded by the sides of a 45 degree angle, with the vertex at the PES, and the 900 feet (270 m) and 1,250 feet (380 m) arcs from the PES. See Figure 3.1.
★61. When required, reduce specific distances for certain exposures. Testing proved there is attenuation of the airblast overpressures from the sides and rear of earth-covered igloos compared to an unconfined surface burst. Some slight overpressure increase occurs at the front. Compute intraline distances from earth-covered igloos from Table 3.4.

Interpolation formulas in the notes for Table 3.6 may be used for explosives weights not listed in these tables. The barricaded columns of Tables 3.4 can only be used for ES authorized K-9 separation in note 6. The provisions of this note do not apply when the ES is a military only taxiway or runway.
62. Use the following table to determine Q-D from a US Third-generation Hardened Aircraft Shelter PES to an Unhardened ES (see note 12 above). Munitions should be separated from the Hardened Aircraft Shelter walls at a distance sufficient to eliminate local breaching. For less than 1,100 pounds, a 3-foot separation distance from the wall is sufficient. For IM distances see paragraph 3.20.
63. Use this K factor for NEW in PES up to 250,000 pounds.
64. Use this K factor for NEW in PES above 250,000 pounds.
65. The K factor indicated will provide protection from blast overpressure. Barricades are required if protection from low angle, high velocity fragments is desired.
66. Use Runway, Airfield Military Use Only, criteria for End-of-Runway and Dearm Crew shelters (see paragraph 3.13.4).
67. Intraline is the minimum distance between separate groups of explosives loaded combat configured aircraft or between aircraft and a pre-load or site that serves to support aircraft. Integrated Combat Turn (ICT) operations using either live or inert munitions are considered a Combat Aircraft Parking Area and must be sited according to procedures in Chapter 4, Section A. All aircraft undergoing Hot Pit refueling are considered to be in transportation mode and are exempt from Q-D requirements as a PES.
68. The K factor indicated will provide IM protection only. K30 is required if blast overpressure protection is desired.
69. An 80-foot minimum distance is advisory, but not mandatory.
70. All hazard class/division (HC/D) 1.1 material, regardless of specific known fragment distances, will drive HAS inhabited building (IB) clear zones based on the specific HAS Q-D criteria and the maximum credible event (MCE) for the shelter. For example, 2,500 pounds of HC/D (14)1.1 material in a 3rd Generation HAS would require K62 (841 feet) from the sides, K50 (679 feet) from the front, and K40 (543 feet) from the rear. This guidance is predicated on the mass detonating characteristics of HC/D 1.1 material and the demonstrated effects of a HC/D 1.1 event in a HAS.
★71. Reserved for future use.
72. If a specific facility is not listed in Table 3.3, see Section C - *Q-D Criteria For Specific Facilities or Situations* for the applicable criteria.
73. Table 3.11 may be used to manage HC/D 1.2 munitions currently hazard classified with IB distance given in hundreds of feet and are in the HC/D (XX)1.2 format until phased out in year 2003. When and where practical use the new HC/D 1.2.1, 1.2.2, or 1.2.3 criteria. New explosives site plans must incorporate the new criteria (see paragraph 4.2.3).
★74. For open/light PES locations: HC/D 1.2.3 IMD from a PES containing HD 1.2.3 items to an ES containing other than HC/D 1.2.3 is K11 (50' min) based on the NEWQD of a single round of the largest (greatest NEWQD) HC/D 1.2.3 item in the PES. For an ES containing only HC/D 1.2.3 items, the IMD from any PES to such an ES is 50 feet. For heavy structures: 50 feet is the required IMD to PES exposures. See Table 3.12 for igloo-to-igloo side/rear orientations. A heavy structure is defined as a structure with a wall thickness $\geq$12 inches of reinforced concrete (18.7 inches brick); a roof thickness $\geq$5.9 inches of reinforced concrete and a barricade between the door and any PES, constructed for protection against high-speed, low-angle fragments (i.e., an earth-covered magazine with a barricaded front). See Table 3.13, Note 7 for IL/PTR/IB guidance.
75. If the ES is a hardened aboveground, non earth-covered structure, apply only a 50' minimum for all quantities and sub-divisions of HC/D 1.2. A hardened structure for this purpose is a buildings with wall thickness $\geq$12 inches of reinforced concrete (18.7 inches brick); a roof thickness >5.9 inches of reinforced concrete and a barricade between the door and any PES, constructed for protection against high-speed, low-angle fragments according to paragraph 3.12.1.
76. See paragraph 2.82 for personnel protection guidance. Remotely controlled operations must be terminated when operating personnel must perform duties at less than PTR from a remotely controlled operation, or when fragmentation protection and PTR separation is no longer provided. This should be documented in local procedures.
77. When stored in structures that may contribute to the debris hazard, the IB, PTR and IL for items whose MCE is greater than 31 pounds is determined by using the larger of the following two distances: those given in Table 3.8. for the appropriate Explosive Weight or those given in Table 3.9 for the appropriate MCE. Explosives in any building are assumed to create building debris unless an engineering analysis shows fragments will not go beyond a lesser distance.
78. See paragraph 2.41, *Multicube or Segregated Magazines*, for special considerations when storing limited amounts of explosives.
79. Consider parked aeroclub aircraft as non-military aircraft for Q-D purposes.
80. (Delete this note)

★Table 3.4. Factors for Computing IL from Igloos.

Exposure	NEW Range (lbs.)	K-FACTOR Barricaded	K-FACTOR Unbarricaded
Front	1 - 300K	10	18
	300K - 500K	10 - 9	18
Side	1 - 300K	7	16
	300K - 400K	7 - 9	16 – 18

	Over 400K	9	18
Rear	1 - 100K	6	12
	100K - 300K	6	12 – 14
	300K - 400K	6-9	14 – 18
	Over 400	9	18

★Table 3.5. Quantity-Distance for 3rd Generation HAS to unhardened ES.

NEW (Pounds)	FRONT (IB/PTR/IL)	SIDES (IB/PTR/IL)	REAR (IB/PTR/IL)
0 - 5	50’	50’	50’
6 - 500	230’	50’	50’
501 - 1100	230’	395’	165’
1101-11000	IB=K50 PTR=K26 Min 300’ IL=K18 Min 300’	IB=K62 PTR=K32 Min 395’ IL=K22 Min 395’	IB=K40 PTR=K20 Min 300’ IL=K14 Min 300’

★Table 3.8. Hazard Sub-Division 1.2.1 Quantity-Distances (IB, PTR, IL)[8,9] For Munitions With NEWQD > 1.60 Pounds. [7]

Explosive Weight (1)	Inhabited Building Distance (2)(3)(4)	Public Traffic Route Distance (5)	Intraline Distance (6)	Explosive Weight (1)	Inhabited Building Distance (2)(3)(4)	Public Traffic Route Distance (5)	Intraline Distance (6)
				7,000	1033	620	372
2	200	200	200	8,000	1055	633	380
5	200	200	200	9,000	1074	644	386
10	200	200	200	10,000	1090	654	392
20	200	200	200	15,000	1154	692	415
40	200	200	200	20,000	1198	719	431
60	200	200	200	25,000	1232	739	444
80	224	200	200	30,000	1260	756	453
100	268	200	200	40,000	1302	781	469
150	348	209	200	50,000	1335	801	481
200	404	242	200	60,000	1361	817	490
300	481	289	200	70,000	1383	830	498
400	535	321	200	80,000	1402	841	505
600	610	366	219	90,000	1419	851	511
800	662	397	238	100,000	1433	860	516
1,000	702	421	253	150,000	1489	893	536
1,500	774	464	278	200,000	1528	917	550
2,000	824	494	296	250,000	1557	934	561
2,500	862	517	310	300,000	1581	949	569
3,000	893	536	321	350,000	1601	961	576
3,500	919	551	331	400,000	1618	971	582
4,000	941	565	339	450,000	1633	980	588
5,000	978	587	352	500,000	1646	988	593
6,000	1008	605	363				

NOTES:

1. Explosive Weight = Number of Items x NEWQD.
2. IB = -735.186 + [237.559 x (ln(number of items x NEWQD))] – [4.274 x (ln(number of items x NEWQD))^2] IB in feet, NEWQD in pounds; ln is natural logarithm, with a minimum of 200 feet.

3. Number of items x NEWQD = exp[27.791-(600.392-0.234 x IB)$^{1\backslash 2}$]. IB in feet; NEWQD in pounds; exp(x) is e^x.
4. Use of equations given in Note 2 and 3 to determine IB/weight combinations is allowed.
5. PTR = 60% of IB with a minimum of 200 feet.
6. ILD = 36% of IB with a minimum of 200 feet.
★7. When stored in structures which may contribute to the debris hazard, the IB for items whose MCE is greater than 31 pounds is determined by using the larger of the following two distances: those given in this table for the appropriate Explosive Weight or those given in Table 3.9 for the appropriate MCE. Explosives in any building are assumed to create building debris unless an engineering analysis shows fragments will not go beyond a lesser distance.
8. For IM criteria, see Table 3.3, Columns 16 & 17, Rows 1-7 and 11-14.
9. See Table 3.12 for side and rear exposures of igloos.

★Table 3.10. Hazard Sub-Division 1.2.2 Quantity Distances (IB,PTR,IL)[7,8]
For Munitions with NEWQD ≤ 1.6 Pounds.

Explosive Weight (1)	Inhabited Building Distance (2)(3)(4)	Public Traffic Route Distance (5)	Intraline Distance (6)	Explosive Weight (1)	Inhabited Building Distance (2)(3)(4)	Public Traffic Route Distance (5)	Intraline Distance (6)
1	100	100	100	7,000	366	220	132
2	100	100	100	8,000	376	226	135
5	100	100	100	9,000	385	231	139
10	100	100	100	10,000	394	236	142
20	100	100	100	15,000	427	256	154
40	113	100	100	20,000	451	271	162
60	123	100	100	25,000	471	282	169
80	131	100	100	30,000	487	292	175
100	138	100	100	40,000	514	308	185
150	152	100	100	50,000	535	321	193
200	162	100	100	60,000	553	332	199
300	179	107	100	70,000	568	341	204
400	192	115	100	80,000	581	349	209
600	211	127	100	90,000	593	356	214
800	226	136	100	100,000	604	362	217
1,000	238	143	100	150,000	647	388	233
1,500	262	157	100	200,000	678	407	244
2,000	279	168	101	250,000	703	422	253
2,500	294	176	106	300,000	723	434	260
3,000	306	183	110	350,000	741	445	267
3,500	316	190	114	400,000	757	454	272
4,000	325	195	117	450,000	771	462	277
5,000	341	205	123	500,000	783	470	282
6,000	355	213	128				

★Table 3.11. (Delete this table)

★Table 3.12. Hazard Class Division 1.2 Separation Distances From Side and Rear Exposures of All Igloos.[1]

Category	HC/D 1.2.1 MCE ≥100 pounds	HC/D1.2.1 MCE <100 pounds	HC/D 1.2.2	HC/D 1.2.3
Intermagazine[2] Distance	50’	50’	50’	50’

Intraline[2] Distance	50’	50’	50’	50’ MIN (3)
Public Traffic Route Distance	300’	200’	100’	50’ MIN (3)
Inhabited Building Distance	300’	200’	100’	50’ MIN (3)

Notes:

★1. For front exposures from all igloos acting as a PES, use Table 3.3, columns 16, 17, 18 or 19, as applicable.

2. No separation is required to other side/rear igloo exposures.

★3. See Table 3.13, Note 7.

Table 3.13. Hazard/Class Division 1.3 and 1.2.3 Separation Distances. (1) (2)(4)(7)(8)(9)

Notes:

1. For quantities less than 1,000 lbs, the required distances are those specified for 1,000 lbs. The use of lesser distances may be approved when supported by test data and/or analysis. Linear interpolation of NEW quantities between table entries is permitted. For quantities above 1,000,000 lbs, the values given above will be extrapolated by means of cube-root scaling as follows:

   a. For inhabited building distance (IB) and public traffic route (PTR) distance, use $D = 8\ W^{1/3}$.

   b. For aboveground intermagazine distance (IM) and intraline distance (IL), use $D = 5\ W^{1/3}$.

2. List of items (examples only): Military pyrotechnics; solid propellants in bulk, in containers, or in ammunition items; and nontoxic chemical ammunition.

3. Items will be placed in this hazard division if they qualify for assignment to it after evaluation in accordance with Chap 2.

4. For reasons of operational necessity, limited quantities of items in this hazard division, such as document destroyers, signaling devices, riot control munitions and the like, may be stored without regard to quantity-distance in accordance with fire protection regulations in facilities such as hangars, arms rooms, and operating buildings.

5. The same distances are used for IB and PTR.

6. The same distances are used for aboveground IM and IL. Earth-covered buildings may be used to their physical capacity for this hazard division provided they comply with the construction and siting requirements of Chapter 3 for HC/D 1.1. Earth-covered magazines used to store only HC/D 1.3 items must be sited for a minimum of 100 lbs of HC/D 1.1 item.

★7. The IBD for Unit Risk HC/D 1.2.3 is determined by using Table 3.13 (Hazard Class Division 1.3 and 1.2.3 Separation Distances) for the NEWQD of the HD 1.2.3 item multiplied by the number of rounds present, but with a minimum IBD determined as follows: If the items are in a structure that can interrupt primary fragments and can contribute debris, the minimum IBD is the hazardous debris distance given in Table 3.9 for an MCE equal to the NEWQD of a single round. If the items are in the open or in a light structure that will not interrupt primary fragments, the minimum IBD is the hazardous primary fragment distance based on the HD 1.1 hazardous fragment area number density criteria applied to a single HD 1.2.3 item. The hazardous fragment distance applicable to items in the open is specified in hundreds of feet in parentheses as “(xx) 1.2.3.” PTR for HD 1.2.3 is equal to 60% of IBD. ILD is computed as 36% of IBD, with a minimum distance equal to the Intermagazine Distance (IMD). See Table 3.3, column 19 for IMD guidance.

8. See paragraph 2.41, *Multicube or Segregated Magazines*, for special considerations when storing limited amounts of explosives.

9. See Table 3.12 for side and rear exposures of igloos (HC/D 1.2.3 only).

Table 3.18. Separation Distances for Missiles in Aircraft Shelters.

★Note 9. (Delete this note)

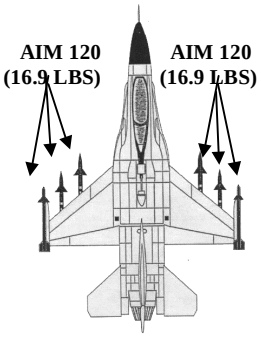
Figure 3.7. F-15 Aircraft Criteria.

★***Note:*** IM or IL criteria for the internal HC/D 1.2 gun ammunition and internal HC/D 1.3 flares do not need to be considered with these loads. The AIM-120s shown are for the 16.9 pound warhead only. AIM-120 models C4/C5 have 19 pound warheads and will require new missile configuration requests in accordance with paragraph 3.35.4.

Figure 3.8. F-16 Aircraft Criteria.

★***Note:*** IM or IL criteria for the internal HC/D 1.2 gun ammunition and internal HC/D 1.3 flares do not need to be considered with these loads. The AIM-120s shown are for the 16.9 pound warhead only. AIM-120 models C4/C5 have 19 pound warheads and will require new missile configuration requests in accordance with paragraph 3.35.4.

★**Figure 3.8. F-16 Aircraft Criteria.**



F-16
CONFIG: 3
NEW: 16.9
IM: 29' IL: 47'
IBD: 500'
PTR: 300'

★Table 3.26. Minimum Distances for Specific Items and Situations.

Line	Item/Situation	Quantity of Explosives	Required Distance (Feet)		
			IB (NOTE)	PTR (NOTE)	IL (NOTE)
1	Above ground storage of demolition explosives, thin cased low fragmentation munitions and in-process explosives	<100 lbs NEW	(1)	(1)	(6)
1.1	Above ground storage – all HC/D 1.1 munitions and explosives.	100-450 lbs NEW	(1)	(9) (1)	(6)
1.2		451- 11,400 lbs NEW	900 (2)	750	(6)
1.3		11,400-30,500 lbs NEW(2)	1250 (1)	750 (2)	(6)
2	Earth covered igloos – all HC/D 1.1 munitions and explosives.	1-150 lbs NEW	500 front 250 side/rear	300 front 150 side/rear	(8)
2.1		151-450 lbs NEW	700 front 250 side/rear	420 front 150 side/rear	(7) (8)
2.2	For ECMs < 26’ x 60’	451-11,400 lbs NEW (2)	900	750	(7) (8)
2.3	For ECMs ≥ 26’ x 60’	451-17,000 lbs NEW (2)	900	750	(7)(8)
3	Locations where structures, blast mats, and personnel shielding will completely confine fragments and debris (for igloos see line 2).	50 lbs NEW or less	K40/50	K24/30	(6)
4	Explosives detector dog training in facilities or buildings.	7 lbs NEW or less dispersed in structure	100 (4)	100 (4)	50
5	Explosives detector dog training Security Police Academy, Lackland AFB TX.	10 lbs NEW or less dispersed in structure	100	100	50
6	2.75” rockets having 4-in. parallel and vertical separation.	All quantities (AUR)	400	240	50 (7)
6.1	2.75” rockets stored and maintained in RSCA buildings. (5)	All quantities	0	0	0
7	AIM-7 series AUR missiles with other than WAU-17 warhead.				
7.1	Single missiles separated according to paragraph 3.34.1.	All quantities	700	420	(6) (7)
7.2	Packed in AUR containers - igloo storage only.	All quantities	500 front 250 side/rear (3)	300 front 150 side/rear (3)	(8)
7.3	Packed in AUR containers - Facilities with aboveground magazines other than igloos.	All quantities	700	420	(6) (7)
8	AIM-7 Series AUR missiles with WAU-17 in igloo storage only.				
8.1	Alternately stacked containers (according to paragraph 3.34.3) and trailers not in radial alignment.	All quantities	500 front 250 side/rear (3)	300 front 150 side/rear (3)	(8)
8.2	Alternately stacked containers (according to paragraph 3.34.3) and no more than 3 trailers in radial alignment.	All quantities	700 Front 250 Side/Rear	420 Front 150 Side/Rear	(8)
8.3	More than 3 trailers in radial alignment, or storage with other AIM-7 or AIM-9 missiles.	MCE = total warheads in igloo (11)	Same as line 2 above	Same as line 2 above	Same as line 2 above

★Table 3.26. Continued.

Line	Item/Situation	Quantity of Explosives	Required Distance (Feet)		
			IB (NOTE)	PTR (NOTE)	IL (NOTE)
9	AIM-7 AUR (not WAU-17) on trailer with or without other AIM-7 (not WAU-17) or 9 missiles stored in igloos	Total quantity of all warheads radially aligned (10)	Same as line 2 above	Same as line 2 above	(8)
10	AIM-7 AUR (not WAU-17) on trailer with other AIM-7 missiles (not WAU-17) not stored in igloos	2-24 warheads radially aligned	700	420	(6) (7)
11					
12	AIM 7 missiles (not WAU-17) stored in facilities other than igloos.	MCE - 100 lbs or less	700	400	(6)
13	Single AIM-9 series missiles, separated according to paragraph 3.34.6, in the open.	All quantities	400	240	50 (3)
14	MK 82 GP bomb in the open	1 bomb	670	400	(6)(7)
15	M117 GP bomb in the open	1 bomb	690	415	(6)(7)

NOTES:

★1. Incremental K40 (IB) or K24 (PTR) may be used when fragments or building debris are not involved. When fragments or building debris are involved see Table 3.9. HC/D 1.2 munitions and HC/D 1.1 munitions with a fragment hazard number assigned are considered high fragmenting munitions. Explosives in any building are assumed to create building debris unless an engineering analysis shows fragments will not go beyond a lesser distance. When in doubt, contact HQ AFSC/SEW, Kirtland AFB.

★2. For sparsely populated locations, reduce the minimum 1,250-foot fragment distance to 900 feet [270 meters (m)] if the PES does not exceed 11,400 pounds (5,140 kg) for ECMs <26' x 60', or 17,000 pounds (7711 kg) for ECMs $\geq$ 26' x 60'. Allow no more than 25 persons in any sector bounded by the sides of a 45 degree angle, with the vertex at the PES, and the 900 feet (270 m) and 1,250 feet (380 m) arcs from the PES. See Figure 3.1.

3. Missile fragments are contained, therefore, since only the contents of one container will react, the secondary igloo debris distances apply.

4. Nonessential personnel will be evacuated a minimum of 100 feet during training exercises.

5. RSCA buildings must have at least 3/8" steel doors. Rockets must face a 12" wall.

★6. See Table 3.9.

7. Does not provide protection against fragments.

8. Use K18 from front, K16 from sides, K12 from rear for MCE, minimum 50 feet (less distance may be used when structures, blast mats and the like can completely contain fragment and debris).

9. Calculate PTR as 60 percent of IB.

10. NEWs for missiles in radial alignment need to be totaled only if warheads are separated by less than 100 inches

★11. A lesser MCE may be used if approved by AFSC/SEW.

Table 3.27. Quantity Distance Criteria For Non-DoD Explosives Activities.[1,2]

Move this table to chapter one and re-designate as Table 1.1.

NOTES:

★1. Non-DoD activities may be conducted only when the risk to the Air Force mission (to include any other tenant DoD mission) has been evaluated and found acceptable, and the non-DoD activities meet the criteria of 10 USC, Section 2692.

2. "Check for IM" means Air Force personnel will determine the MCE for an event as that quantity of explosives that are not separated by IM distance, or equivalent protection.

3. Explosives operations conducted by DoD, or other federal agency, under DoD oversight, procedure, and/or control and in accordance with the explosives safety standards of this manual. This term is applicable only to DoD and federal explosives operations, and to non-DoD commercial enterprises directly supporting DoD and federal explosives contractual efforts.

4. Explosives operations/storage conducted on DoD property in accordance with only this table, BATF, FAA or other federal, state, and local explosives safety requirements. Under these type operations, DoD will be responsible only for insuring IM standards are met as outlined in explosives site plan submissions. This does not constitute "DoD oversight" as intended in note 3.
5. Any space or orbital launch facility that supports both DoD and non-DoD launch services and operations, as determined by Air Force personnel or by mutual agreement when multiple DoD military services are involved.
6. DoD/non-DoD explosives storage under DoD control.

★4.1.3.5 (Added) Non-DoD Explosives Activities on DoD Installations. An explosives site plan for non-DoD explosives facilities on AF installations must be prepared and submitted through AF channels for DDESB approval. These site plans will identify any explosives safety risk to Government assets within or outside of the non-DoD facility explosives Q-D arc. DDESB site approval for non-DoD operations and non-DoD storage will be limited to a "foot print" only (data that determines the IBD arc). Building design, lightning protection, etc., will not be included unless it is used to determine the IBD arc. Approval of the explosives site plan is only one of a series of approvals that must be granted by Government organizations to allow a non-DoD explosives activity onto an AF installation. The responsible commander must sign all explosives site plans prior to submittal to higher headquarters. The responsible commander must make a safety risk assessment concerning the possible loss/damage to any exposed Government facility/hardware based on current DoD mission requirements, future use of the facility by DoD components, range safety criteria, and any other pertinent data such as probability of occurrence of an explosives incident and time of exposure of Government assets as applicable. Non-DoD user insurance coverage for Government assets will not, by itself, be adequate justification for a non-DoD explosives activity to expose a Government facility to an unacceptable risk. See Table 3.27 for Q-D criteria for non-DoD explosives activities and para 5.2.8 for guidance on waivers, deviations, and exemptions.

★4.3.1.2. ESPs for war plan operations are forwarded from the installation level through command safety channels to the MAJCOM/CC/CV for approval. Information copies will be sent to AFSC/SEW for review (to determine proper application of Q-D standards). However, if the ESP involves new construction (either for an ES or PES), it will be forwarded from the installation level through command safety channels to the Air Force Safety Center/SEW. After review by AFSC/SEW (to determine proper application of Q-D standards), the ESP will be endorsed by AFSC/SEW to the DDESB for approval. The MAJCOM may choose to combine day-to-day and war plan operations into a single ESP (e.g. using tiered siting); these ESPs will be approved according to paragraph 4.3.1.1.

★4.3.1.3. During MOOTW/contingency/combat operations, the installation will engage in the process of explosives site planning to ensure Q-D standards are met. The Q-D standards of DOD 6055.9-STD, Chapter 10, may be used if Q-D standards of this manual (or other Service criteria if designated by Combatant Command procedures) cannot be met. An ESP should be prepared as soon as possible and approved in accordance with Combatant Command procedures. If a MOOTW/ contingency/combat operation is projected to last longer than 12 months, the ESP will be forwarded through command safety channels to the Air Force Safety Center prior to the 12-month mark. After review by AFSC/SEW (to determine proper application of Q-D standards), the ESP is endorsed to the DDESB for approval.

★4.3.2. Tenant units forward ESPs through the host installation and command safety channels. In cases where the host exposes a tenant facility, the host MAJCOM will obtain agreement of the tenant MAJCOM before processing the site plan. When a US Air Force unit is tenant on an Army, Navy or Marine base, request formal site plan approval through that service. The site plan must meet the Q-D requirements of this regulation in addition to all host agency criteria. Submit an information copy of the site plan request through command safety channels to HQ AFSC/SEW.

★4.3.2.1. (Added) Inter-service Installation Coordination. In cases where an Air Force PES generates an explosives IBD clear zone encroaching onto an adjacent DoD services installation, the local Air Force wing responsible for submitting the site plan will obtain written acknowledgement from the exposed service component SE and CE equivalent offices for inclusion with the site plan submission package. It will be up to the acknowledging agency to update their maps to reflect the Air Force explosives clear zone for their future planning purposes. See paragraph 3.2.1.1 for additional guidance. The MAJCOM and HQ AFSC will coordinate with the applicable service component equivalent prior to requesting DDESB site plan approval.

★4.3.3. MAJCOM weapons safety staffs must review subordinate units' site plans (for day-to-day and war plan operations, and MOOTW/contingency/combat operations which exceed 12 months) for accuracy and compliance with the standards in this manual. MAJCOMs will then submit original and one copy of the ESP to HQ AFSC/SEW. Include a MAJCOM safety endorsement stating approval along with any changes, modifications or specific precautionary measures considered necessary.

★4.6.2. Vehicle inspection stations, and transportation change of mode operations to include roll on/off operations not involving lifting. Off-installation MILVAN/ISO container transfer involving highway and rail modes only, where containers are not stored and no other operations are performed, do not require site plans.

★**4.7. Facility Modifications or Change in Use.** Existing facilities may be modified as needed to meet changing mission requirements. If the modification increases the required quantity-distance separation, or increases the overall floor space, such as room additions, an ESP is required (except during the first 12 months of a MOOTW/contingency/combat operation). MAJCOM and unit safety staffs must work closely with civil engineers and users, to ensure safety standards are not compromised. The following rules apply to these modifications:

★4.10.4. Submitting Tiered Explosives Site Plans. Use the general guidance in paragraph 4.11.2 when submitting tiered sited plans. Use the maximum proposed explosives quantities for preparing the PES/ES paired relationship listing required in paragraph 4.11.5.6. Specify the document used in paragraph 4.10.3 above, it is not necessary to include it in the site plan. Assign a separate site plan number for each tier in accordance with Attachment 4, paragraph A4.2.1.4.

★4.11.4.5.1. Lightning protection system drawings must include a top view of the facility showing the locations of the elements of the lightning protection system, such as air terminals, masts, overhead wires, grounding electrode system and a description of the surge protection. Include at least a front and side view of the facility showing the zone of protection required by NFPA 780, Section K (100 feet rolling sphere), unless the rebar in an igloo is used as part of the lightning protection system. Provide additional views, as necessary, after considering all possible placements of the rolling sphere concept. The drawings must contain dimensions. Drawings should show that the lightning protection system meets the 100-foot striking distance criteria (except for igloos where the rebar is used in lieu of air terminals). Include documentation of the commander's risk acceptance for submissions involving LPS exceptions (see paragraph 2.54.1.8).

★5.2.8. (Added) Waivers, deviations, and exemptions for non-DoD explosives activities on DoD installations. Waivers, deviations, and exemptions to AF explosives safety requirements of this manual will not be granted to non-DoD user explosives site plans for explosives facilities. Rather the site plan will: (1) Clearly specify situations where non-compliance with explosives safety requirements exist; (2) Include a risk acknowledgement letter by the non-DoD user; (3) Include the necessary operating restrictions to ensure that Government owned flight hardware, facilities, or other resources will not be hazarded by the non-compliance(s) to a level unacceptable to the owner of the assets; and (4) Include a recommendation for approval/disapproval of the site plan from the local AF explosives safety office with supporting rationale, and obtain the coordination of the non-DoD user on the explosives site plan prior to submittal to higher headquarters.

★5.3.1. Exemptions and Waivers. All planned construction in support of day-to-day and war plan operations, and MOOTW/contingency/combat operations exceeding 12 months, not meeting Q-D standards, must be approved by the Secretary of the Air Force (SAF). Additionally, an action which places an existing facility that was constructed within the past three years at less than prescribed distances from a PES requires SAF approval. The Air Force Chief of Safety may deviate from this requirement on a case-by-case basis. Approval level of all other exceptions for day-to-day and war plan operations, and MOOTW/contingency/combat operations exceeding 12 months, will be based on the level of risk assumed by the specific hazard. Risk-based approval levels range from SAF/MI down to Numbered Air Force commander level. As specified in Figures 5.1 and 5.2, NAF commanders may delegate approval authority for the lowest levels of risk to wing commanders or equivalent. Approval level of waivers for MOOTW/contingency/combat operations less than 12 months in length will be determined by the Combatant Command. Also see Table 5.4 for approval levels.

★5.4.2. Approval Levels for Reviews. Exceptions will be reviewed at the original approval level unless units elect to apply risk-based criteria to existing exceptions approved under the previous methodology. If the PES or ES data identified in an exception package changes, apply risk-based criteria to determine the appropriate level for review. Also see Table 5.4 for approval levels.

★Table 5.4. (Added) Q-D Exception Approval Levels

IF	AND	THEN
No current exemption	Change causes exemption to facilities constructed within the past 3 years	SAF-approval required
No current exemption	Change causes exemption to facilities not constructed within the past 3 years	Apply nomograph
SAF-approved exemption for new construction	Change causes increased risk within 3 years of construction	SAF-approval required
SAF-approved exemption for new construction	Periodic review within 3 years of construction	SAF-approval required
SAF-approved exemption for new construction	Change causes increased/ decreased risk more than 3 years	Apply nomograph

	after construction	
SAF-approved exemption for new construction	Periodic review more than 3 years after construction	Apply nomograph
SAF-approved exemption not involving new construction, approved prior to use of nomograph	Change causes increased/ decreased risk	Apply nomograph
SAF-approved exemption not involving new construction, approved prior to use of nomograph	Periodic review	Apply nomograph
SAF-approved exemption not involving new construction, SAF-approval driven by application of the nomograph	Change causes increased/ decreased risk	Apply nomograph
SAF-approved exemption not involving new construction, SAF-approval driven by application of the nomograph	Periodic review	Apply nomograph

★6.8.3.4.5. Clearance procedures to be used and an assessment depth chart.

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

★**Combat Aircraft Parking Area.** An aircraft parking area meeting both explosives safety and airfield criteria.

★**Designated Aircraft Parking Area.** An aircraft parking area meeting airfield parking criteria.

★**DoD Explosives Safety Board (DDESB).** The DoD organization charged with promulgation of ammunition and explosives safety policy and standards, and with reporting on the effectiveness of the implementation of such policy and standards.

★**DoD Operations/Storage.** Explosives operations conducted by DoD, or other federal agency, under DoD oversight, procedure, or control and in accordance with the explosives safety standards of DoD 6055.9-STD. This term is applicable only to DoD and federal explosives operations, and to non-DoD commercial enterprises directly supporting DoD and federal explosives contractual efforts.

★**Earth-Covered Magazine.**
Box-type A magazines constructed according to NAVFAC drawings 1404000 through 1404007 and box-type B magazines constructed according to NAVFAC drawings 1404018 through 1404025.

★**Explosives Safety.** A condition where operational capability, personnel, property, and the environment are protected from the unacceptable effects of an ammunition or explosives mishap.

★**Explosives Safety Management.** A process of risk management, consisting of policies, procedures, and engineering controls, that reduces the probability and the consequences of an ammunition or explosives mishap.

★**Explosives Site Plan.** Package consisting of all information necessary to assess compliance with explosives safety standards (especially quantity-distance standards) for an explosives storage or operating location. Once approved, this package identifies storage and operational limitations, and provides a tool for management of risks associated with the storage or operating location. Note: An ESP can also be prepared for a non-explosives exposed site.

★**Explosives Sited Combat Aircraft Parking Area.** An aircraft parking area meeting both explosives safety and airfield criteria.

★**Fragmenting Munitions.** Items having cases designed to fragment in a specified manner. Examples include continuous rod warheads, items with scored cases and items containing pre-formed fragments. Items fitting this definition are usually air-to-air missile warheads such as the Sparrow, Sidewinder, and AMRAAM.

★**Improvised Explosive Device (IED).** A device placed or fabricated in an improvised manner incorporating destructive, lethal, noxious, pyrotechnic or incendiary chemicals, designed to destroy, disfigure, distract or harass. It may incorporate military stores, but are normally devised from non-military components.

★**Installed Explosives.** Explosives items installed on aircraft or contained in survival and rescue kits such as flares, signals, egress system components, squibs, and detonators for jettisoning external stores, engine-starter cartridges, fire extinguisher cartridges, destructors in electronic equipment, explosives components of emergency equipment, and other such items or materials necessary for safe flight operations.

★**Joint Storage.** DoD/non-DoD explosives storage under DoD control.

★**Mishap.** An accident or an unexpected event involving DoD ammunition and explosives.

★**Non-DoD Operations/Storage.** Explosives operations/storage conducted on DoD property in accordance with Table 1.1, BATF, FAA or other federal, state, and local explosives safety requirements. Under these type operations, DoD will be responsible only for insuring IM standards are met as outlined in explosives site plan submissions. This does not constitute "DoD oversight" as intended in the definition of "DoD Operations/Storage."

★**Non-Robust Munitions.** Those items not meeting the definition of Robust or Fragmenting munitions. Examples include torpedo warheads, underwater mines, most CBUs, TOW, Hellfire, and Stinger missiles.

★**Robust Munitions.** These are munitions meeting two of the following three criteria: (1) have a ratio of the explosive weight to empty case weight less than 1.00; (2) have a nominal wall thickness of at least 0.4 inches; and (3) have a case thickness/NEW $^{1/3}$ >0.05in/lb $^{1/3}$. The following cartridges are, by definition, robust: 20, 25, and 30 mm. Other examples of robust ammunition include MK80 series bombs, M107 projectiles, Tomahawk and Harpoon penetration warheads.

★**Shared Launch Facility.** Any space or orbital launch facility supporting both DoD and non-DoD launch services and operations, as determined by AFSC or by mutual agreement when multiple DoD military services are involved.

★HOW TO COMPLETE AF FORM 943, EXPLOSIVES SAFETY SITE PLAN

★A4.1. Form Purpose: Use this form to describe the quantity-distance relationships when siting a new PES or non-explosive ES (at less than IBD), updating a previous siting action or submission of explosive waivers and exemptions. (See Figure A4.1, *AF Form 943*). If additional space is needed to explain any information required on this form, use the transmittal letter (for example, a referenced action number, requested exception expiration dates, etc.).

★A4.2.1. Action Number. Use a four part number as follows to identify the action.

★A4.2.1.2. The base or location where the action is located (for example, HILL, RAMSTEIN, LOGAN, etc.).

★A4.2.1.3. Calendar year designation (99, 00, 01).

★A4.2.1.4. An (S) identifier for the site plan request followed by a sequence number (1 through 999). Number each request sequentially for each calendar year. For example, the first site plan for the year would be S1. If more than one PES is included in the request, include an identifier for each. For example; S4, S5, or S6. Canceled requests will not affect the numbering of subsequent requests. For example, if site plan USAFE-RAMSTEIN 99-S10 was canceled, the next siting submitted for Ramstein AB in 1999 would be 99-S11. If the siting involves Q-D exceptions, include the statement, "WITH EXCEPTIONS" immediately following the site plan identification number. Detail the exceptions in Section III.

A4.2.3. (Delete this paragraph)

A4.2.4. (Delete this paragraph)

A4.2.5. (Delete this paragraph)

★A4.3.1.2. Column 2. First line: Describe, using the descriptions in Table 3.3 the type of facility or location being sited. For example: Earth-covered magazine, 7 Bar. State the facility/operation being sited has a barricade if it affects Q-D.

★Fourth Line: Show the total number of people (M for Military or DoD Civilian, C for Non-DoD Civilian and FN for Foreign Nationals) normally assigned to the location. Do not include casuals such as inspectors or quality control evaluators.

★A4.3.1.3. Column 3. Show the proposed NEWQD for the new or updated PES, or the previously approved weights for existing sites being updated. List all hazard classes (*Exception:* HC/D 1.2.3, 1.5 and 1.6 may be omitted unless quantities are to be sited). If no explosives in a particular hazard class will be sited, type “None”. The explosive authorization must always show the sited, waived, or exempted weights, whichever is greater. Type “None” for each HC/D for non-explosives sitings. For multiple room or bay facilities, show the NEW for each room or bay. For HC/D 1.1, 1.2.1, 1.2.2, 1.2.3, and 1.3 show a number; for HC/D 1.4 show “Capacity or op limit”. The proposed NEWQD should reflect the mission need or physical capacity not necessarily what the distance will allow. Even though a facility may be sited for physical capacity, store only minimum essential quantities required for the current mission.

★A4.3.1.4. Column 4. Show all class/divisions categories regardless if there will be an amount sited (*Exception:* HC/D 1.2.3, 1.5, and 1.6 may be omitted unless quantities are to be sited). List separately for each room or bay as applicable.

★A4.4. PES/ES Information: Use this section to describe the most restrictive Q-D relationship between the proposed siting and other exposed sites (ES) or potential explosion sites (PES) for each Hazard Class/Division. As a minimum, when siting a PES show all exposures within IBD. In addition, when siting a non-explosive ES show all PESs which are within the evaluation zone (EZ) of the ES. When the EZ for a PES being sited exceeds that of the IBD, show only the PESs between the IBD and EZ. The evaluation zone (see glossary) is based on the Q-D type of the ES, e.g. Operating Location, Combat

Aircraft Parking Area and the applicable K Factor or minimum distances of HC/Ds in the PES. See Figure 4.1. Use the largest amount of NEWQD or MCE as applicable for each HC/D authorized on the base to determine the size of the EZ.

★A4.4.1. Columns 5 through 8. Same data elements as shown for columns 1 through 4. For exposures requiring only 50' min or no QD separation distance, use one line entry. If exceptions are involved, assign each exception a unique identification number using the format as described in paragraph A4.2.1 in column 6. This unique identification number will be based on the approval level. For example, use 388FW-Hill-99-W1 as the first wing level identification number for the calendar year 1999. Use ACC-Hill-99-W1 as the first MAJCOM level identification number, not W2. Subsequent site plan submissions with Q-D exceptions would use the next available exception number. For example, the next wing level exception identification action number would be 388FW-Hill-99-W2, not W1. This method will allow accurate tracking of exceptions based on the approval levels and calendar year. Annotate the identification number preceding each ES or PES with exception. Use the identifiers (W) for waivers and (E) for exemptions. Include superseded waiver or exemption identification numbers if applicable. If either the facility/operation being sited or the ES has a barricade affecting Q-D, indicate this after the facility description in Column 6. Example: Above Ground Magazine (Barricaded).

★A4.4.2. Column 9. Show the actual distance from the facility listed in column 2 to facility listed in column 6. For exposures requiring only 50' min or no QD separation distance, use one line entry.

★A4.4.3. Column 10. Show the *most restrictive* (greatest) separation distance, for each class/division, looking both ways required between columns 2 and 6. For exposures requiring only 50' min or no QD separation distance, use one line entry.

★A4.5.3. Item 3. Give the reason for the request. Describe the impact if the requested action is not approved.

★**Figure A4.1. AF Form 943.** *(**NOTE:** Document is shown representatively to illustrate use.)*

EXPLOSIVES SITE PLAN

SECTION I -- GENERAL INFORMATION

ACTION NUMBER	**BASE/LOCATION**	**DATE**
AFMC-ACC-Hill-99-S1 WITH EXCEPTIONS	Hill AFB, Utah	30 Jan 2001

SECTION II -- SITE DATA

SITE INFORMATION				**PES/ES INFORMATION**						
FAC NO.	FACILITY/OPERATION DESCRIPTION Owning Unit and No. Of People	SITED NEWQD	HC/D & MCE	FAC NO.	FACILITY/OPERATION DESCRIPTION Owning Unit and No. Of People	SITED NEWQD	HC/D & MCE	DIST ACT	DIST REQ	SEP FACTOR Table 3.3 Col/Line/Note
1	2	3	4	5	Waiver/Exemption No.	7	8	9	10	11
999	Operating Location Bomb Build-Up Pad ACC -388FW – 10 M * Denotes the authorized IB parenthetical hazardous fragment distance and the largest single round NEWQD for Unit Risk HC/D 1.2.3 items permitted at this location.	60,000 145,526 100,000 5,000 5,000 Op Limit	1.1 1.2.1>450 1.2.2 *(14)≤450 1.3 1.4	930	Storage Magazine- AboveGround - Barricaded Bomb component storage ACC-388 MXS	6,446 3,751 500,000 70,000 70,000 Capacity	1.1 1.2.1≤202 1.2.2 *(09)≤450 1.3 1.4	335’	335’ 335’ 282’ 324’ 185’ 50’	6/8 16-17/8(77) 18/8 19/8 20/8 (58) 21/8
				Ogden Street	Public Traffic Route On-base road - Medium traffic density AFMC-375 ABW	None None None None None None	1.1 1.2.1 1.2.2 1.2.3 1.3 1.4	950’	940’ 891’ 386’ 840’ 115’ 100’	8/25 (9) 1617/25(77) 18/25 19/25 20/25(59) 21/25
				938	Operating Location 20MM/Flare/Chaff Processing ACC-388 MXS 6M	None None 10,000 5,000 5,000 Op Limit	1.1 1.2.1 1.2.2 *(03)≤450 1.3 1.4	750’	705’ 535’ 232’ 504’ 75’ 50’	8/8 16-17/8(77) 18/8 19/8 20/8 (58) 21/8
				938-A	Paint Locker ACC-388MXS	None	None	800’	50’	8/27 (36)
				950	Earth-Covered Igloo 7 Bar Dwg # 421-80-06 Side Exposure ACC-388MXS	30,000 28,118 500,000 500,000 500,000 Capacity	1.1 1.2.1>450 1.2.2 *(12)≤450 1.3 1.4	990’	498’ 50’ 50’ 50’ 400’ 100’	1/8 (61) 16/8 (57) 18/8 (57) 19/8 (57) 20/8 (58) 21/8
				5000	***388FW-Hill-99-W1*** Public Traffic Route POV Parking (Admin) ACC-388 FW	None None None None None None	1.1 1.2.1 1.2.2 1.2.3 1.3 1.4	920’	940’ 891’ 362’ 840’ 115’ 100’	8/25 16-7/25(77) 18/25 19/25 20/25 (59) 21/25
				5001	***ACC-Hill-99-W1*** Inhabited Building Military Personnel Flight(MPF) ACC-388 FW 35M	None None None None None None	1.1 1.2.1 1.2.2 1.2.3 1.3 1.4	1000’	1566’ 1485’ 643’ 1400’ 115’ 100’	8/28 16-17 (77) 18/28 19/28 20/28 (59) 21/28
				9000	Defensive Fighting Position ACC-388SPS 2M	None	None	25’	0’	8/27 (36)

Section III - EXEMPTION/WAIVER DATA

1. IMPACT ON MISSION IF MISHAP OCCURS

388FW-Hill-99-W1: The MPF POV parking lot requires K24 separation, but is located at K23.5 from facility 999. A maximum credible event at 9999 would no have any adverse affect on mission accomplishment since it is a POV parking lot. Some injuries/deaths may occur to personnel transiting the parking lot fro flying debris and fragments. Based on the nomograph, the approval level for this exception is the NAF/CC (delegated to the wing commander). **388FW-Hill-99 W2:** The MPF requires K40 separation, but is located at K25.5 from facility 999. Facility 1255 would receive significant structural damage from blast effec approximating 20% of the replacement cost. Moderate fragment damage is expected, depending largely upon the munitions involved and its fragmentatio characteristic. Personnel in the open are not expected to receive serious injuries; however some injury is expected due to fragments. Personnel in the facility ma suffer serious injuries from secondary effects, such as building debris and glass breakage. Impact on the MPF's mission capability would be interrupted fo approximately one month. Based on the nomograph, the approval level for this exception is the MAJCOM/CC.

2. ACTIONS TAKEN TO MINIMIZE RISK (Unusual controls, precautions, etc.) AND PROGRAMMING CONSTRUCTION ACTIONS TAKEN TO CORRECT EXCEPTIONS, RECOMMENDED ACTION FOR HIGHER HEADQUARTERS

Munitions activities will be limited to nightly operations to the maximum extent possible limiting the length of time the MPF is exposed to the potential explosion site. The amount of munitions present on the bomb build-up pad will be limited to an operational necessity and this pad will not be utilized as a storage or holding area for munitions. Munitions supervisory personnel will ensure all personnel are certified for munitions operations conducted on the pad. Safety personnel will conduct spot inspections during bomb build-up operations. Glass windows in the MPF facing the pad will have a protective film applied to minimize hazards from flying glass shards. A new MPF facility and parking lot is programmed for FY 2001, (project #01-97-007). The new facility's location is outside of any explosives clear zone and will eliminate the two quantity-distance exceptions.

3. JUSTIFICATION OR IMPACT ON MISSION IF SITE PLAN IS NOT APPROVED

New mission requirements of the 388FW predicate continuous munitions support. The proposed bomb build-up pad request and the two associated quantity-distance exceptions present the best alternative considering available land, operational requirements, and practical safety applications. There is currently no other facility space available to utilize in the interim.. The requested net explosives weights are the minimum needed to meet the new mission requirements. Relocating the MPF and its associated POV parking lot before utilizing the bomb build-up pad was not feasible due to the immediate implementation of the tasking for munitions support and the timelines needed for budgeting and relocating the MPF and parking lot. Disapproval of this request will adversely affect the 388FW's mission readiness.

SECTION IV - CERTIFICATION

COMMANDER CONCURRENCE		
TENANT UNIT (When Applicable)		
Concur ☐ Non-Concur ☐	**PRINTED OR TYPED NAME**	**SIGNATURE**
INSTALLATION/WING		
Concur ☐ Non-Concur ☐	**PRINTED OR TYPED NAME**	**SIGNATURE**
INTERMEDIATE COMMAND/STATE ADJUTANT GENERAL (ANG only)		
Concur ☐ Non-Concur ☐	**PRINTED OR TYPED NAME**	**SIGNATURE**
MAJOR COMMAND		
Concur ☐ Non-Concur ☐	**PRINTED OR TYPED NAME**	**SIGNATURE**

★Attachment 10

★Q-D GUIDANCE FOR ON-BASE ROADS

★A10.1. In order to prevent the generation of a significant number of quantity-distance exemptions, the new DoD 6055.9-STD requirements allow the DoD components to establish procedures for assessing, documenting, and accepting the risks associated with application of Q-D criteria to on-base roads for Potential Explosion Site (PES)/on-base road relationships which existed prior to 1 Oct 00. Q-D criteria is based on the traffic density (PTR or IBD). After 1 Oct 00, any changes to a PES which increase its Q-D arc, construction of a new PES, or construction of a new on-base road, will require application of Q-D criteria to on-base roads which are traveled by personnel not involved in PES-related operations. If Q-D criteria cannot be met, the formal exemption requirements of AFMAN 91-201 must be followed.

★A10.2. For those sited (DDESB- or AFSC-approved or MAJCOM baseline-approved) PES/on-base road relationships which existed prior to 1 Oct 00, we require the following risk assessment and documentation be accomplished:

★A10.2.1. On a copy of the installation map, identify the following:

★A10.2.1.1. All PESs having Q-D arcs (PTR or IBD based on traffic density) encompassing on-base roads traveled by personnel not involved in munitions-related operations.

★A10.2.1.2. The Net Explosives Weight for Quantity-Distance (NEWQD) of the above PESs.

★A10.2.1.3. The applicable Q-D arcs (PTR or IBD) of the above PESs based on the traffic density.

★A10.2.1.4. The segments of the applicable on-base roads which pass through the above arcs.

★A10.2.2. Perform a risk assessment of the relationships shown above in accordance with Operational Risk Management procedures. Some factors that might be considered include:

★A.10.2.2.1. Operational necessity.

★A.10.2.2.2. The operation being performed (e.g., static storage, maintenance, and production).

★A.10.2.2.3. Operational activity cycles.

★A.10.2.2.4. Alternate routes.

★A.10.2.2.5. Traffic density.

★A.10.2.2.6. Accident records.

★A.10.2.2.7. Time interval of exposure.

★A.10.2.2.8. Type and quantity of munitions in proximity to the area transited.

★A.10.2.2.9. The closest distance from the area transited to the PES.

★A.10.2.2.10. The need for installation-related personnel to transit the ESQD arc.

★A10.2.3. Document the commander's risk acceptance through a formal memorandum. This memorandum must include the map showing the relationships for which he/she is accepting risk, a summary of the risk assessment, and a statement that the subject relationships existed as of 1 Oct 00.

★A10.3. It is highly recommended that the above risk assessment and documentation be accomplished as soon as possible to accurately capture the relationships, which existed as of 1 Oct 00, and to avoid DDESB survey findings. The commander's risk acceptance and attached map must be included in amendments to site plans (for PESs which existed prior to 1 Oct 00), or referenced if previously submitted with another site plan amendment, which do not increase the Q-D arc. As stated previously, after 1 Oct 00, any changes to a PES which increase its Q-D arc, construction of a new PES, or construction of a new on-base road, will require application of Q-D criteria to on-base roads which are traveled by personnel not involved in PES-related operations.